Chapter 3

Methodology

3.1 Research strategy

To achieve the aims of the study it was appropriate to use a quantitative approach. This is a strategy that is deductive and involves the testing of theory, using a natural science model and objectivism. The research design used was essentially experimental and the methods used were the standardised behaviour tests and questionnaire. A quantitative approach was chosen for this research, as the study aimed to objectively evaluate evidence, rather than discover underlying meanings (Firestone, 1987). Both experimental methods produced numerical and statistical data which could be used to test the theory.

The review of literature in the field of animal personality revealed that standardised behavioural tests could be of value to the equine industry in assessing personality and so suitability for use in particular roles. There is however a need to address the issue of reliability of responses and validity of these tests in measuring suitability of individual horses, which with notable exceptions has largely been ignored (Chapter 2, Gosling, 2001). In order to embark upon these issues, it was first necessary to develop a set of objective tests, which could be interpretable in terms of practical situations (Seaman et al., 2002). This was achieved by developing a set of standardised behaviour tests based upon those reported in literature. The tests incorporated all the techniques summarised in Chapter 2, but were modified to make them viable to those working in the equine industry. The design of the tests is described

in section 3.3. Once the tests had been developed they were piloted with a small number of horses. It was established that the tests were workable and that the time periods used were sufficient to obtain adequate data on the horses' behavioural reactions.

The next task was to establish whether the behavioural tests were reliable (see Chapter 4). Although some authors have addressed this issue (Chapter 2), the literature revealed only certain tests have been assessed and only by using test-retest reliability; inter-observer reliability was not established. Test-retest reliability was examined by recording the behavioural responses of the horses on two different occasions (Martin & Bateson, 1993). Inter-observer reliability was achieved by measuring the extent to which two observers obtained similar results when measuring the same behavioural responses on the same tests.

Tests were also explored to assess whether there was any evidence of habituation between test retest (Chapter 4). This measured whether there was a significant decrease in response between trials, which has been found in past studies (e.g. Seaman et al., 2002; Visser, 2002). Tests that were reliable or where change in response could be explained by ethological reasons, were used in the validity analysis.

Once reliable tests had been established, their validity in measuring a horse's suitability for a role was assessed (Chapter 6). Police horses were chosen, as it is very important to select horses, which can cope with the demands of

this critical job. If unsuitable horses are chosen, time and money in training these horses are wasted.

Very little research has been done on establishing the suitability of use in horses. Therefore it was necessary to design a tool which could enable this to be achieved. The most appropriate method was to design a rating scale to capture the knowledge of members of staff who work with the horses on a day to day basis, as they are the best people to judge how well a particular horse performs in different situations relating to their job. The design and reliability assessment of this are outlined in Chapter 5. Horses' ratings on suitability scores were then compared with their responses to the standardised behavioural tests to look for correlations between the two (Chapter 6). This identified how horses of high suitability performed on the standardised behaviour tests. Such tests could then be used to screen potential recruits to aid in selecting those horses most likely to be suitable for the roles a police horse has to perform.

3.2 Ethics (animals)

The majority of ethical concerns focused upon the animals used in the study. Research on animals is tightly governed by the Animals (Scientific Procedures) Act 1986. The Act regulates any experimental or other scientific procedure applied to a protected animal that may have the effect of causing the animal pain, suffering, distress or lasting harm. Before a 'regulated procedure' can be carried out, the establishment where the project is going to be conducted, the person performing the procedure and the actual project itself, require separate licences (State, 2000). The Secretary of State has

developed guidelines (Guidance on the Operation of the Animals (Scientific Procedures) Act 1986) to assist researchers in deciding whether they need to apply for these licences.

However, these guidelines were developed for invasive types of research such as medical research, where procedures have the potential to cause pain and suffering to the animals e.g. injecting substances, conducting surgery and toxicology testing (Nuffield Council on Bioethics, 2004). These standardised guidelines assist researchers in carrying out ethically sound studies and licensing provides a framework to tightly monitor research to ensure minimum cost to the animals involved. A common threshold has been established for regulating the use of animals for experimental or other scientific purposes (European Directive 86/609/EEC) and regulation starts at the skilled insertion of a hypodermic needle.

The research undertaken in this study was well below this threshold. However the parts of the guidelines that refer to psychological stress may be relevant to this study. Although the Home Office makes no clear statement addressing those undertaking non-invasive procedures involving psychological stress, it has established equivalent thresholds for these classes of procedure, but will only give advice on application on a case by case basis (State, 2000).

Students at the University of Chester cannot conduct a regulated procedure. Nevertheless, many of the studies conducted by animal behaviour students may cause some degree of psychological stress to the animals. This is,

however, likely to be minor in comparison with the effect of many laboratory procedures and it would therefore be inappropriate to contact the Home Office over every student dissertation to ensure that studies do not exceed the thresholds devised by the Home Office.

For this reason it was necessary to seek some guidance to decide whether it would be acceptable to proceed with the project, or whether it would be essential to apply for licences from the Home Office. To assist researchers in making ethical decisions, guidelines have been formulated by Learned Societies, including

The Association for the study of Animal Behaviour (ASAB) – http://asab.nottingham.ac.uk/ethics.html ,

The International Society for Applied Ethology (ISAE) –

http://www.applied-ethology.org/ethicalguidelines.htm

and The British and Irish Association of Zoos and Aquariums (BIAZA) – http://www.biaza.org.uk/public/pages/care/index.asp .

These guidelines make useful recommendations, but are more concerned with commercial establishments such as laboratories, farms and zoos. A useful aspect concerned with this study is the section on using aversive stimuli, such as fear induced stimuli. They state that this should be minimised in severity and duration in accordance with achieving the aims of the experiment and that escape routes should be made available to allow the animal to avoid the stimuli (Sherwin et al., 2003). The tests in this study were kept short in duration and animals were given the option to flee in an arena in which they could not be harmed.

The University of Chester Ethics Committee provide guidelines that were useful in assisting in the decision. They state that a procedure does not need regulating if it is applied in the course of recognised animal husbandry practices. The horses used in this study were police- and riding school horses and as part as their normal routine the horses are faced with many environmental challenges on a day to day basis: they will encounter novel objects such as poles, street furniture and road works, additionally horses are often during their training desensitised to unusual objects, e.g. plastic bags. Horses may also face many unfamiliar situations such as moving vehicles and barking dogs and during their training horses are often habituated to loud noises such as football rattles, crowds of people and moving objects such as bikes. Horses may also face social isolation, such as being turned out into a paddock or being kept in a stable on its own. It may also be part of a horse's role to cross testing surfaces such as water, ditches, bridges and road markings.

The tests used in this study represent these types of situations, which are commonly encountered by horses in these varied roles. The difference being that the situations were highly controlled, much shorter in duration and the horses' welfare was taken into consideration throughout the test procedures.

It is important for those carrying out animal research, to think about the ethical implications of their studies first and to design them in such a way, that they can and will be conducted without exposing the animals to undue stress. All guidelines written for all sources of animal research state it is necessary to do this from a utilitarian standpoint, which makes the use of animals for scientific purposes acceptable in such situations when the harm

(physical or psychological) done to the animals in the study is outweighed by the benefits of the findings of the research to other animals, humans and the environment and that any harms are minimised. It is important to consider this cost:benefit analysis (Sherwin et al., 2003) at the three major stages of any study: design of study, running of tests and disseminations of findings.

1) Design

The application of cost:benefit analysis at the design stage will determine whether the proposed study is justified. The costs to the animals in this study were the potential short-term psychological stress caused by the standardised behaviour tests and the mild discomfort caused by the pinch test. The benefits of this study were the potential gain in knowledge, which could be used in selecting horses suitable for a particular job. This in turn would reduce the cost and time of selecting unsuitable animals, enhance the safety of the people riding and training the horses and it would therefore improve the overall efficiency of the mounted police unit/riding school. The tests applied in this study will only cause short-term stress, which is justified when weighed against the potential long term benefits to working horses. The tests were kept short and designed to cause as little stress as possible to the horses.

At the design stage it was also important to seek ethical approval. Approval was gained from the Department of Biological Sciences Ethics Committee for the use of animals in this study (see Appendix 2). Informed consent was also gained from the owners of the horses (see Appendix 3).

It was also important to efficiently manage the project, to ensure deadlines were met, a project time table can be seen in Appendix 12.

2) Running

During the trials horses were continuously monitored to consider how they were coping with the tests. Researchers have a duty to endeavour to cause no harm (principle of non-maleficense, Holland (2003)). If the costs appeared to prevail over the benefits for any of horses, they were removed from the study. Only horses which were healthy and physically fit were used in the study. This reduced the available sample size, as quite a few of the horses had medical problems which could have become aggravated during the tests. But the cost of potentially harming one of the horses outweighed the benefit of gaining a larger sample. At Manchester Police Unit, where one of the horses became overly stressed during the social isolation test, it was decided not to proceed with the next unusual noise test, to avoid the horse becoming more stressed.

For insurance reasons the police horses were handled by staff of the establishments where the tests were taking place. They were instructed on how to conduct the tests– no force was used to compel a horse into action. All researchers wore appropriate clothing – BHS approved riding hat, boots and gloves to avoid injuries.

3) Dissemination

A fundamental component of the ethical justification of animal behaviour research is the communication of results (Sherwin et al., 2003). To avoid duplication of research projects and to assist other researchers of a subject,

it is important to arrange for completed work to be published in scientific journals (Lehner, 1996). This study will be written up as a paper with Dr Creighton and has been presented at conferences including UFAW Animal Welfare Conference and the 4th International Equitation Science conference. A copy of the poster and abstract can be seen in Appendix 4. Preliminary findings have already been sent to the Police Units to inform them of the findings and a full report will follow.

The ethics concerning human participants is described in Section 5.2, which is in relation to the questionnaire.

3.3 Design of the tests

The standardised behaviour tests used in this study were based on those reported in literature, but were modified to ensure they were feasible. The length of the tests and procedures were developed further by conducting pilot work, which was carried out by Creighton (Personal communication, 2006). As behavioural responses could not be predicted prior to conducting the tests and because more than one response was possible for each test, it was necessary to video the horses' reactions to the standardised behaviour tests and develop a set of measures post hoc.

Evaluating the videos allowed a set of coding categories to be developed which covered the full range of the horses' behaviour. The coding categories were modified during this process, until a set of categories was produced which could be comprehensively and unambiguously defined by other observers (Martin & Bateson, 1993). The behaviour categories included different forms of locomotion, latency to approach or touch objects, distances

between horse and challenge, and postural expressions. Initially accurate measures were taken for each of the behavioural categories and then once the data had been collected it was possible to simplify some of these measures by means of post hoc classifications, making them more feasible in an industrial environment. This was necessary to make measures robust so that they can be repeated in the field by lay people. The design of the tests and the measures used to capture the reactions of the horses are described below.

3.3.1 Social isolation test

This test has been used previously by several researchers (e.g. Seaman et al., 2002; Le Scolan et al., 1997), designed to assess a horse's behaviour when placed in isolation from other horses and humans. Horses are released into a familiar arena, as surroundings known to the horse enable the researcher to examine social isolation separately from the fear of a novel environment (Wolff et al., 1997). An indoor school was chosen, as this was a location familiar to the animals, whilst also providing a safe, weather proof setting. The horse's reaction was videoed for three minutes as it has been noted by Wolff et al. (1997) that during the first few minutes the horse's reaction to being alone in an arena are the strongest and most revealing of individual differences. During this test it was important that the person videoing remained out of sight of the horse.

The behaviours measured and the scores used to code them are listed below.

1) Duration of time (seconds) horse stood within two horses' lengths of the door.
2) Duration of time walking – this was split into exploratory and alert. Exploratory behavioural expressions included – horse's nose bellow belly line with its ears, eyes and head pointing towards the object including the floor. Alert walking included – horse's head above belly line, eyes, ears and head not pointing towards object or floor.
3) Duration of time trotting/cantering – these behaviours were grouped together as they were not commonly displayed by horses during the tests. Trotting is defined as two beat gait between walk and canter on alternating diagonals and canter defined as a three beat gait between trot and gallop.
4) Duration of time spent exploring whilst standing –This included the same behavioural expressions as for walking, with the horse being stationary.

3.3.2 Stranger approach test

This test was adapted by the method used by (Hausberger & Muller, 2002) in which the experimenter suddenly approached a horse in a box. A similar method was used in the study, with a few modifications. Instead of approaching a horse in a box, an arena was used so that the horse did not feel cornered and could easily move away from the human. Hausberger and Muller (2002) recorded the initial response of the horse only, which this study also measured. However, a longer time period of one minute was used to explore whether the horse interacts with the human and whether it remained close to the human during the test period. Seaman et al. (2002) demonstrated that eye contact did not affect the horse's behaviour, but for

consistency the experimenter approached the horse in a steady and purposeful manner without directly making eye contact with the horse. The experimenter stopped one metre in front of the horse and this distance was used as it allowed the horse to decide whether it wanted to approach the human, remain stationary or move away from the human.

The following behavioural variables and scores were developed to capture these. They included;

1) Horses' initial reaction to the human

A) Horse moves towards the human

B) Horse stands still and turns towards the human.

C) Horse stands still and turns away from the human.

D) Horse moves away from the human.

2) Horses interaction with human – once the human stood still, some horses chose to interact with the human by touching them. This was measured by the latency of time to touch the human. After scanning the data it became evident that many horses chose not to touch the human, so the scores were categorised into 'horse touches human' and 'horse doesn't touch human'.

3) Amount of time horse spent in close proximity of the human – recorded in seconds.

3.3.3 Unexpected noise test: Shaker

The literature review revealed that the use of this test is rarely mentioned in published current research. Past methods were not considered feasible and it

was therefore decided to design a test using a novel sound, which was easily replicated, a percussion shaker met this criteria. The methods used in past studies required a handler to lead the horse, which did not allow them to flee. This study used a noise generated from outside the test area (out of view) and allowed the horse to express an unrestrained range of behaviour. This allowed the horses to flee and ensured that the noise occurred unexpectedly. The shaker was rattled for 10 seconds and this gave sufficient time for the horse to hear the noise and to react. The horses' initial reactions to the sound were recorded. Behavioural measures and scores used to evaluate reactions included:

1) Horses' postural expression (what its body did in relation to the noise).

A) Horse 'froze' – no change in reaction.

B) Horse orientated towards the sound – eyes, ears and head pointing towards the sound.

C) Horse was startled – body tensed up, head raised, ears back and weight shifted backwards.

2) Horses flight reaction

A) Remained still – did not flee

B) Fled at walk

C) Fled at trot or canter

3.3.4 Novel object test: Lampshade

The literature review revealed that in previous research a number of innovative objects had been used to examine a horse's reaction to novel objects. Unfortunately many of these were not practical for general use; it was therefore decided to obtain an object for this study. A large lampshade was used by Creighton (personal communication, 2006) in her preliminary work and was found to be effective and safe for the horses to touch. In past studies horses were often loose during the test and so generally ignored the objects, therefore the horses in this study were led up to the lampshade to a distance of one metre. It was important to allow the horse the full length of the lead rope, giving the animal the 'choice' of touching the object or not. Then the horses' behaviour was recorded for one minute, as during this time their reaction to novelty would be at its strongest (Wolff et al., 1997). Keeping the test short also aided in decreasing the likelihood of habituation. Behavioural variables and scores used to capture their reactions included:

1) Duration of time touching the object

The duration horses touched the object varied. This numerical value was used in analysis.

2) Duration of time exploring object

The duration horses explored the object (no touch) varied. Exploring was defined as horses nose bellow belly line with its ears, eyes and head pointing towards the object.

3) The latency of time for the horse to touch the object

Originally this was recorded as a true latency, but after looking at the data it could be that horses generally touched the object immediately or not at all. So the measure was categorised into

A) Horse touched object within the first 10 seconds.
B) Horse touched object after 10 Seconds
C) Horse didn't touch object

3.3.5 Sudden fast moving object test: Automatic umbrella opening

The literature review revealed the most feasible technique to be the opening of an automatic umbrella, its rapid release unlikely to be anticipated by the horse. In past studies horses have been restrained and were therefore unable to express behaviour such as fleeing from the stimulus. Horses' were released in this study before opening the umbrella, to allow an opportunity to flee from the stimulus. The umbrella was opened one metre in front of the horse and left open for one minute. This duration was sufficient to record the horse's initial reaction and also to allow a fleeing horse time to return and touch the umbrella. Behavioural measures and scores used to measure this included.

1) Horses postural expression.

A) Mild startle – head moves up and/or ears move back and/or tail swishes.

B) Medium startle- body and/or neck tenses, head moves up and body weight shifts away.

C) Severe startle – body tenses head moves up and horse moves away (any leg movement).

D) Freeze – no observable response.

2) Horses' flight reaction.

A) No flee < 2 paces of walk.

B) Flee > 2 paces of walk.

C) Flee > 2 paces of trot/canter.

3) Does horse touch umbrella – on observing the videos it could be seen that some horses touched the umbrella whilst others did not. The horses were coded into;

A) Touches umbrella.

B) Doesn't touch umbrella.

3.3.6 Pain/discomfort test: Skin pinch

Mackenzie and Thiboutots (1997) method of using pressure was adopted, but to make the test more feasible the horse was pinched using a person's thumb and fore fingers. The horses were pinched on their chests as this area of their body is not generally touched, handlers were instructed that they must have short fingernails. Horses were free to move away from the pressure, which was released when the horse moved away or after 10

seconds. Behavioural measures and scores used to record the horses' reactions included;

2) Horses' postural expressions

A) Signs of discomfort – ears back, head raised, tail swishes and horse moved away.

B) No signs of discomfort – horse did not display any of the above.

2) Does horse move away from the human

A) Horse did not move away.

B) Horse did move away.

3.3.7 Unusual surface test: Large plastic sheet

To test the horses' reaction to an unusual surface a large plastic sheet was used. This surface was chosen as it was shown to be the most feasible used in past studies. It was readily available, safe and produced a rustling noise when handler and horse moved onto it. The handler approached the sheet from at least 20m away, to allow the horses' reaction on its approach to the sheet to be recorded. At this stage there was no interaction between the horse and human and the horse was led on a loose rope. The handler approached the sheet at a steady pace and until the horse stopped (if at all). At this point the handler encouraged the horse to continue forward by lightly tugging the rope and giving gentle voice commands for up to 30 seconds. The horses were never forced to enter/cross the sheet and the test ended when either the horse refused to go any further or had crossed the sheet.

Behavioural measures and scores used to record the horses' reactions included;

1) Horses' initial reaction to the sheet – (before encouragement).

A) Horse crossed sheet without a change in rhythm.
B) Horse crossed sheet with change in rhythm.
C) Horse stopped when humans foot touched the sheet
D) Horses stopped between 1-2 horses' lengths from sheet.
E) Horses stopped greater than two horses' lengths from sheet.

2) Horses' response to encouragement.

A) None needed.
B) Horse responded with forward movement across the sheet.
C) Horse responded with forward movement of one pace or more without touching the sheet.
D) Horse responded with forward movement of <one pace.

A summary of the final coding framework can be seen in Appendix 5. Coding sheets were designed for each of the behavioural tests, which allowed the horses' reactions to be recorded efficiently.