DOPING OF RACEHORSES

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Doping, a word derived from an American slang term for opium, implies the use of drugs to alter athletic performance and the same general considerations apply whether the athlete is human or animal. Different types of athletic performance make different demands on the competitor and each is open to particular possibilities from the doper's point of view. In the horse, performance may consist of flat or steeplechase racing, trotting, show jumping, cross country events, dressage and so on.

The study and control of doping has received most attention for racehorses, that is horses running under Jockey Club or National Hunt rules and this discussion is largely confined to racing of this type.

Doping has been recorded since Roman times but I do not support the suggestion (Czaky 1972) that it represents part of man's aspiration to equal the Gods and so can be said to have started in the Garden of Eden. Such aspirations may be true of human athletes but horses are doped entirely for monetary gain. In 1666 a regulation was made at Worksop forbidding the use of stimulants in horses running there and, in the 1790's, two men were hanged at Cambridge for poisoning horses at Newmarket with Arsenic (Clarke 1962).

Horses may be doped to run faster or slower or drugs may be used to mask some functional defect, usually a lameness. The incidence of drugs found in urine samples by members of the Association of Official Racing Chemists over a 14 year period to 1964 are shown in Table I. Stimulants are high on the list and it is known that horses are more likely to be doped to win as losing can easily be arranged without the use of unpredictable drugs. The incidence of stimulants is probably made still greater by the practice of sampling more winners than other runners.

The high position of procaine in the table may result from its use as a local anaesthetic to give temporary relief from lameness but it may also result from the extensive use of procaine penicillin for treating infections. Procaine is metabolised more slowly in the horse than in many other species (Czaky 1972). Phenylbutazone is extensively used as an anti-inflammatory analgesic for the treatment of various forms of lameness. In some states of the U.S.A. the use of this drug is now permitted but treated horses must be declared.

In Britain phenylbutazone, procaine, caffeine and theobromine have appeared as positives in recent years and, of the depressants, acepromazine figured in a notorious drug affair several years ago (Moss 1974). Corticosteroids have also been implicated as in the famous "Hillhouse", a horse who was believed to have manufactured abnormal quantities of endogenous steroid.

Urine samples for the detection of doping are taken regularly from flat and steeplechase races and some samples are taken at every race meeting. The whole process of control depends on a rule of racing which states: "It is an offence to administer to a horse any substance, other than a normal nutrient, which could alter its performance at the time of racing". (Report of Paton Committee 1971). The interpretation given to this rule is, in effect, that a sample taken from a horse shortly after racing must not contain any substance considered by the Jockey Club not to be a normal nutrient. In practice, the critical sample is invariably urine. Salivary samples are sometimes taken, but the evidence they provided almost usually requires confirmation by a positive urine sample.

When a positive sample has been confirmed, those involved, including the owner and trainer of the horse and those of the trainer's staff who had access to it before the race, are called to an official Jockey Club enquiry. The trainer and owner may be represented legally and can bring experts to testify on their behalf, but this is a tribunal of the Jockey Club and not a court of law. Although the Enquiry appears sometimes to make findings of guilt on evidence which would not satisfy a court, the existence of such a rigid system must have a deterrent effect on would-be dopers.

It is perhaps, inevitable, though at the same time unfortunate, that many of the enquiries held in recent years have involved situations in which the offending substance has been given to the horse quite innocently and sometimes in apparently trifling quantities. Offences can be considered as "technical" in which compounds such as theobromine are given to a horse by feeding normal feeds containing cocoa shell or "deliberate" in

which a drug, often a stimulant, is administered as a dose at some time before racing. Cases of the latter type would lead to disqualification and loss of licence for those involved.

Current doping research is of two types, designed to discover:

1. How drugs may most effectively be identified and estimated in urine and saliva samples.

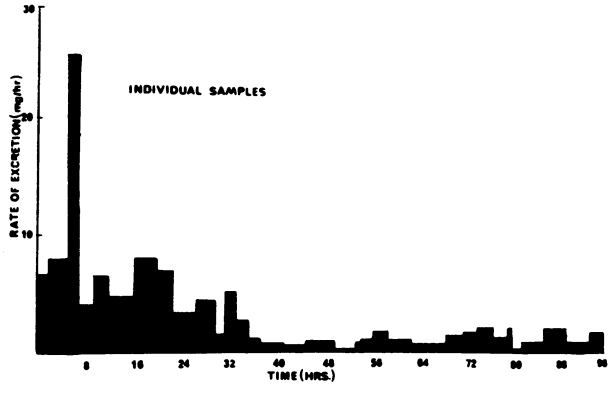
2. How drugs may alter the performance of a horse and what doses are needed.

Drugs are extracted from urine and analysed by conventional but highly sophisticated analytical techniques which have been extensively discussed elsewhere. (Moss 1974). It is worth noting that it is extremely difficult, if not impossible, to decide from a single sample how much drug was given or when or how it was administered. In some cases it is difficult to decide even which drug has been given. For instance, a dose of caffeine given to a horse is excreted as caffeine and theobromine, while acepromazine appears in urine as metabolites of the similar, but less active, compound promazine (Weir & Sanford 1972).

In general, after oral administration, urinary excretion reaches a peak and then declines over a period, which may last for several days as shown in Fig. 1. It is the persistence of this tail of excretion which has been the cause of several enquiries in the past and which will doubtless cause more trouble in the future.

Our recent experimental work has been largely aimed at answering the question of how drugs alter performance. Horses are kept in training and the effects of drugs are examined in regular exercise schedules. Tests are carried out blind and each horse is examined individually its performance on dosed days being compared with that on control days.

We have used four different types of test to assess the effects of drugs on running speed and co-ordination.



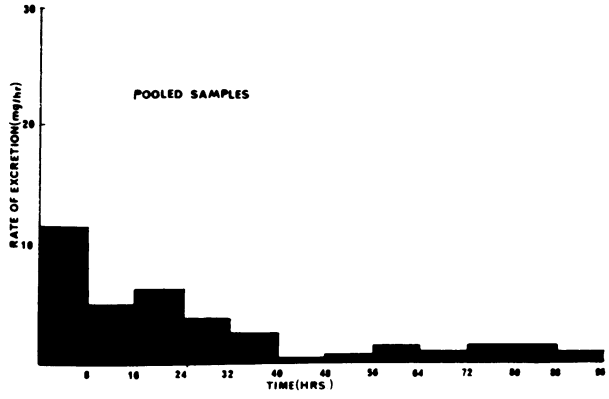


Fig. 1. The excretion of total metabolites of promazine in horse urine following a single intramuscular injection.

Note the long duration of excretion and the wide variation in the amount excreted in individual samples.

1. Racecourse Test

A limited number of tests have been carried out on a local racecourse where our horses have been run singly or as a group of 3 or 4 timed over distances of 4 or 5 furlongs (800 or 1,000 metres). As might be expected horses running together are faster over the same distance than when they are run individually but a simulated race test presents several problems which we have not fully solved. Ideally a close system of handicapping is required, otherwise the horses are likely to run in a recognised order, the speed of running being determined by the leading horse.

2. Short-gallop Test

This is a sprint timed over 200 or 400 metres from a running start. Horses are run singly each week day over the test period of 4 to 6 weeks. This test has proved to be a sensitive indicator of the effects of centrally acting drugs and we have found, for instance, that speed is increased by caffeine and methylamphetamine and decreased by tranquilisers of the phenothiazine type.

3. Indoor Performance Test

This test is carried out in an indoor riding school which provides an oval circuit of approximately 100 metres circumference. Each horse does two trial circuits on each rein at the collected and extended trots and at the canter.

These circuits are then followed by two tests of co-ordination consisting of a line of 6 cavalletti traversed at walk and trot and a double line of cones traversed at the trot. These tests are scored by counting the number of times that the obstacles are hit by the horse. After each passage up and down the cones they are moved closer together so that the lane between them becomes narrower.

A jumping course was originally included at the end of the performance test, but this gave little useful information and has since been omitted. The performance test as a whole gives useful information and is not dependent on the weather or state of the ground. It does, however, have several limitations. Distances are too short to give any real indication of speed under stress, an excited horse may run slower due to the efforts of the rider to control it and the horses tend to become bored by the procedure after several weeks of practice. Heart and respiratory rates are recorded before, during and immediately after each test.

4. Lunge Test

This is the only test routinely applied in which the horse is not ridden. Each horse is lunged at the canter for 10 minutes in either direction in a circle 17 metres in diameter and covers a total distance of some 6 km. Running speed is recorded but the test is designed more to assess the effects of drugs on the cardiovascular and respiratory system. E.C.G. and heart rate are recorded by radio-telemetry and respiratory rate by direct observation and special attention is paid to the rate of recovery following exercise (Aitkin, Sanford & McKenzie, 1973).

As might be expected, heart and respiratory rates may be affected not only by running speed, but also by raised environmental temperature and by changes in the degree of excitement produced. The latter factor will itself depend on the type of drug under examination and the temperament of each horse.

Results obtained with some of the drugs which we have examined are summarised in Tables II and III.

Methylamphetamine, methylphenidate and pemoline all increased speed in doses which had no significant effect on co-ordination. Increased running speed obtained by doping with methylamphetamine has been confirmed by a limited number of racecourse tests. Although improvements obtained by these stimulant drugs in the short-gallop test were of the order of 5% it would be wrong to extrapolate this order of difference to races over the standard lengths of 5 furlongs or more. In such a race situation one might expect the actual improvement to be similar, i.e. not more than one second, but this could well be sufficient to alter the results of a race.

Of the xanthine series of drugs only caffeine increased speed while theobromine and "millophylline"[1] (etamphylline-a theophylline derivative) were ineffective. In a racecourse test over 5 furlongs doping with caffeine appeared to have no effect on running speed although dosed horses were obviously more excited at the start.

The opiates had a variable effect on performance but tended to impair co-ordination. The etorphine/aceptromazine combination "Immobilon"[2] which is used to immobilise wild animals and is also used as an anaesthetic agent in equine practice had a very potent action. Since the actual volume of injection is so small (less than one ml) and it might be difficult to detect the amounts present in the body, it could possibly be used as a doping agent. Since etorphine is, however, classified as an addictive drug it would not be easy to obtain and the variability of response to small doses would make its successful use debatable.

In our examination of drugs which depress performance (Table III), we have concentrated mostly on compounds having tranquillising activity. These compounds tend to depress both speed and co-ordination although it is possible to envisage that they could be used beneficially to improve control of a highly nervous animal. The anti-inflammatory agent phenylbutazone had no clear effect on normal horses, although the corticosteroid, prednisolone, used in a small number of tests, did appear to increase speed with impaired co-ordination.

In most cases in which an effective stimulation or depression was obtained the riders were aware of a difference in the behaviour of their mounts, but it is doubtful whether such changes would be apparent to someone who was not familiar with that particular horse.

Although these experiments have given us a great deal of useful information, they do have serious limitations. The tests have been designed primarily to show the effects of drugs having stimulant or depressant effects on the central nervous and cardiovascular systems and would not necessarily prove to be useful indicators of compounds which lessened fatigue or improved muscle power. It may also be argued that simple tests of this type do not give a useful indication of what could be expected in a race when, as Beecher and Smith (1965) have stated, "form, mood and motivation" of the subject are of great importance. On the other hand, simple tests on horses repeated often enough to allow reliable statistical evaluation will surely give more useful information than speculation based on the known actions of drugs in other species. Unless some organisation is able and willing to provide the very considerable resources needed for simulated race tests, a test scheme of the type which we have operated would seem to be the best possible alternative.

In its report, made some four years ago, the committee of the Joint Racing Board (Paton Committee 1971) recommended that pre-race testing of samples should be developed. Such a system of testing has

[1] *Dales Pharmaceuticals Ltd.*
[2] *Reckitt & Coleman Ltd.*

obvious advantages but is not, in my opinion, likely to come into operation for some years hence. This view is based partly on the difficulty in obtaining urine from horses before a race and partly on the very considerable problems of carrying out an analysis in the limited time available. In greyhound racing, where pre-race testing is in operation, problems of prize money and of the racing record of the suspected animal do not assume such importance as they would with a thoroughbred race-horse.

In conclusion, we believe that we have demonstrated that it is possible to dope horses to win. We have not so far examined the effects of anabolic agents, though they are known to be widely used and demand consideration in this context. Successful doping requires a good knowledge of the actions of drugs, a familiarity with the peculiarities of a particular horse and a careful selection of the optimum time and dose in previous experimental trials. I would suggest that anyone having these attributes and prepared to go to these lengths could find a less hazardous way of making a living.

Acknowledgements

I am grateful to all my colleagues in the department of Veterinary Pharmacology who have assisted in this work which has been supported financially by the Horserace Betting Levy Board and by Racecourse Security Services Ltd.

TABLE I

Drugs found in samples from race horses from 1949-1964 (From report of the Association of Official Racing Chemists) (Czaky 1972)

Drug	Times Reported
Procaine	392
Caffeine	332
Amphetamine	316
Phenobarbital	84
Phenylbutazone	84
Theobromine	69
Dipyrone	53
Ephedrine	50
Morphine	49
Thiamine	46
Methamphetamine	44
Barbiturates	42
Nikethamide	38
Methylphenidate	38
Strychnine	36

and 19 other compounds including promazine, chlorpromazine and pemoline > 5 and < 30

TABLE II

Drugs having potential stimulant actions examined in tests.

Drug	Type	Result: Speed	Co-ordination	Heart rate
Methylamphetamine	Stimulant of	++	0	++
Methylphenidate	CNS	++	0	0
Pemoline		++	0	0
Ephedrine	Stimulant of CNS	0	0	0
Caffeine	and	+	0	+
Theobromine	cardiovascular	0	0	0
Etamphylline	system.	0	0	+
Nitroglycerine	Vasodilator	0	0	+

+ = increase, 0 = no effect

TABLE III

Drugs having potential depressant actions examined in tests.

Drug	Type	Result: Speed	Co-ordination	Heart rate
Morphine	Central analgesic ınd & depressant	+ 0	0	0
Etorphine and acepromazine		+	0	++
Pentobarbitone	Depressant	–	N.E.	N.E.
Promazine	Tranquilliser	–	–	–
Acepromazine		–		–
Azeperone		–	N.E.	0
Phenylbutazone	Anti-inflammatory	0	0	0
Prednisolone		±	–	0

+ = increase, 0 = no effect, – = decrease, N.E. = not examined.

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