

Fixing ancestral problems. Genetics and welfare in companion animals focusing on syringomyelia in Cavalier King Charles Spaniels as an example

Report of the Companion Animal Welfare Council Workshop
Tuesday 29th April 2008, House of Lords

Background

In its 2006 Report on 'Breeding and Welfare in Companion Animals', the Companion Animal Welfare Council urged and encouraged efforts to tackle genetic problems that affect the welfare of companion animals. CAWC noted that '*Responsibilities for contributing to the tackling of the problems fall to many groups including those involved in developing and overseeing breed standards, breeders, judges, veterinarians, geneticists, animal welfare scientists, regulators and the companion animal owning public.*' Almost two years from the publication of this Report - the main focus of which was the nature of the problems, rather than the detail of how they could in practice be tackled – CAWC wished to review and look in more detail at the sorts of measures that are being undertaken and so organised this workshop.

Very many (>1000) species of vertebrates are bred and kept as companion animals in the UK (CAWC, 2003). The widespread development of specific morphs, strains and breeds (from fish to mammals and birds) was apparent and the possible welfare consequences of this were identified as an area of concern.

Aim

The aim of the workshop was to review the sorts of measures that are being undertaken to tackle genetic welfare problems and to consider various questions related to this. What are the latest developments? Are there any major bottlenecks or constraints that are inhibiting progress? If so, how might these be overcome?

The focus of the workshop was the condition of syringomyelia in the Cavalier King Charles spaniel. It was hoped that focusing on this topic, may help in identifying further steps that can be taken to tackle it and that, more widely, identifying the strategies being used to tackle this problem, and the roles of the various players involved (breeders, scientists, owners etc), may be helpful in highlighting important principles and generalities relevant to developing generic approaches to tackling genetic welfare problems in companion animals.

CAWC indicated that it aimed to produce a summary note of key points arising at the meeting and that it would be likely to be interested in pursuing the subject further if it was apparent that further debate could be helpful.

The preparation of this report

Following the workshop, the first draft of this report was promptly prepared. This was circulated to all participants for their comments and noting that: '*In producing the final version CAWC will consider and try to take account of any comments received*

but, this being a controversial subject, we can imagine that we may receive conflicting views and it may not be possible to please everybody.’ And that ‘After Friday 23rd May, we will produce and publish a final version as soon as we can (if necessary, with a comment indicating that the wording in places was not satisfactory to all participants).’

In line with this, although we have attended carefully to comments received on the draft report from participants at the meeting, and are pleased that there was much about which there seems to be agreement, we must indeed record that some of the wording of this report may still not be satisfactory to all the participants.

This is a Report of the CAWC Workshop and not a CAWC Report. It may become the latter if approved as such at a future meeting of Council.

Syringomyelia in Cavalier King Charles Spaniels (CKCS)

Syringomyelia, the presence of fluid filled cavities in the spinal cord, arises in a proportion of CKCS as a result of a mismatch between the size of the brain and the skull such that the hind brain is forced into the foramen magnum (the canal in the skull through which the spinal cord passes) causing abnormal pressures in the cerebrospinal fluid. The disease has become recognised since about 1997 when the technique of MRI scanning became available which revealed these abnormalities. It is thought that the disease arose in association with intensive selection, involving few founder animals, for longer muzzle length in the early twentieth century. Short muzzle length had been selected for, according to taste, during the nineteenth century. Syringomyelia is seen also in several other toy breeds.

Incidence of syringomyelia has been difficult to ascertain as questionnaire based surveys are likely to underestimate the problem and previous MRI studies may overestimate the problem because sampling was not random. MRI studies have indicated that some 37 to 74% of CKCS of >2.5 years old have syringomyelia. The proportion of these animals with clinical signs varied between 0 and 25% depending on the primary purpose of the study. A questionnaire-based survey analysed at Purdue University indicated 3.4% incidence of clinical syringomyelia. If this lower figure is correct then the extrapolation would be that thousands of CKCS across the world are suffering with this disease as there are >11,000 CKCS registered each year in the UK alone (plus a similar number of unregistered dogs). Clinically affected animals show signs of mild to severe head and neck pain. The clinical picture varies: some severely affected animals showing agitation and vocalising, others reluctance to move.

MRI scanning can be used to screen animals but is not an ideal screening procedure because (i) it is not a simple procedure to undertake (it has to be done under general anaesthetic) or interpret, (ii) it is costly, and (iii), for screening, it should be used in animals that have reached at least 2.5 years – beyond the age when breeders wish to start using the animals for breeding. Opinions differ about approaches (see ‘Approaches to tackling genetic diseases’ below) but some currently recommend that in breeding towards the elimination of the disease, animals which develop clinical signs prior to 2.5 years should not be bred but that MRI positive but asymptomatic dogs can be bred with other dogs demonstrated to be clear of SM by MRI scan taken after 2.5 year of age. This is because of concern that if breeding was prevented in all

MRI positive animals, the resulting further inbreeding might result in emergence of other problems. The strategy is a compromise.

Efforts are underway to develop genetic tests: in the first instance searching for genetic markers but with the hope that specific genes associated with the disease will be found, and that it will be possible to develop specific tests to identify carriers at an early age.

Further genetic aspects

Recent efforts, as yet unpublished, to learn more about the genetics of the disease have indicated that it has a high heritability. One implication of this is that intense efforts to eliminate it through selective breeding might be effective over a rather few generations (eg 4 or 5). However, syringomyelia is not the only genetic problem in CKCS, mitral valve disease also has a high prevalence and the need for simultaneous tackling of these diseases (and avoiding further inbreeding) complicates the approach.

Efforts at the Animal Health Trust are being directed to the development of optimum breeding strategies and the establishment of a web-based interface for use by breeders to help them identify potential mates for their dogs that present the least risk of perpetuating genetic diseases. A third element of the programme will involve educational initiatives for breeders on these matters.

Approaches to tackling genetic diseases

Where genetic diseases occur that cause welfare problems in companion animals - and here we are referring to principles and in all companion animals (eg fish, reptiles, amphibians, birds and mammals) - there are various possible responses. These are outlined below.

- (i) If maintenance of breed purity is taken to be the priority – then the approach pursued might be (as some advocate in the case of syringomyelia in the CKCS – see above) to take steps to eliminate the problem through selective breeding whilst as far as possible minimising further loss of genetic diversity in cases where the population is already very inbred (eg dog breeds).
- (ii) If breed purity is not such a priority – then outbreeding (with another breed or breeds) may offer advantages. Whilst there could be risks with this, of introducing other genetic diseases, generally one would expect that advantages would be more likely than disadvantages. Ideally, this would be undertaken in managed programme – perhaps directed to try to address particular problems. To illustrate this using syringomyelia as our example again: since this a consequence of large brains in small skulls and selection for increased body size tends to result in relative greater size increment in skeleton than brain size, it might prove beneficial to breed for increased body size (whether or not this idea might have merits in the case of CKCS needs further consideration – some do not think it appropriate).

- (iii) If animal welfare is the only consideration – then a decision might be made not to breed from any carriers or potential carriers of the disadvantageous trait even if this meant that the strain or breed might be lost. (For example, if a new colour morph of, say, a species of snake was bred but this strain was found also to be predisposed to a genetic disease that compromised welfare, then, if the priority is welfare, ceasing to breed this strain would resolve the problem).

It is apparent (and it was apparent at the meeting) that preferences concerning these options differ radically. This is not because of differences in the importance attached to welfare – all believe it very important. Some people feel strongly that breed purity is a great priority (whilst seeing welfare as a great priority also), others take the view that breed (the details of particular morphology and appearance) is not so important, being largely a matter of fashion, and that where it might be advantageous for the animals' quality of life to relax the pursuit of breed purity, this should be the way forward. As far as we are aware public opinion on the desirability of breed purity in this context has not been surveyed.

As for the idea of not breeding from any potential carriers in order to prevent births of further animals whose welfare is compromised when the consequence of this would be that some lines or breeds might go extinct, it is apparent that there are strongly held views against this approach. As discussed above in the context of CKCS, one reason for this is that – depending on the circumstances - not breeding from potential carriers could lead to further loss of genetic diversity that may compromise the tackling of other genetic problems in a population. It was suggested that public opinion would not support the approach of not breeding from potential carriers in order to prevent births of animals at risk, but here again, as far as we are aware, public opinion has not been surveyed. The other side of this coin is acceptance that, during the course of efforts to eliminate genetic welfare problems, perhaps over a number of generations, animals will continue to be bred that are affected with painful and / or debilitating conditions.

It is important that, in the design of strategies to tackle these problems, the priorities (as outlined above) are clearly identified in each case as these will greatly influence the approach adopted. There seems to be a need for further debate about these fundamental aspects.

Some complications

For many types of companion animals, there are no systems for recording or overseeing breeding. For example, although firm data are lacking, it is estimated that about as many CKCS may be bred outside the registration scheme as within it, ie each year about 10-12k bred and registered and another 10-12k bred and not registered. Exerting influence on breeders outside such registration schemes is very difficult. Another complication (and no doubt there are very many others) is that of permanent and reliable identification of individual animals.

Public education and sources of information

There was agreement that ideally detailed health and welfare information (about breeds and individuals within breeds) should be available to the public. It is presumed

that this would be used in selection of pets and that it would help drive health and welfare improvements. With time more such information is becoming available and among those involved in its provision are the Kennel Club and some breed clubs. There was general support for the suggestion that breed clubs and the Kennel Club might work more closely together further to find ways to make more health and welfare information available.

Syringomyelia has not been one of the conditions about which information is provided at the Kennel Club web site. However, it is planned that current Kennel Club funded research into the genetics and epidemiology of the disease will soon provide the necessary information for this.

It is not easy for the public to know where to go to get good advice about where to obtain animals about whose health and welfare status there can be some assurances. It was suggested that, for dogs, the secretaries of breed clubs would be a good source of such information but, on the other hand, the question was raised as to whether, generally, health and welfare status might be better in non pure-bred dogs. The crucial point is that reliable information about the health provenance of animals of whatever species or breed should be available: and breed clubs have a very important role here.

New initiative on syringomyelia in CKCS

At the meeting, it was suggested that scientists studying the epidemiology and genetics of syringomyelia in CKCS should get together with breed club representatives, facilitated by the Kennel Club, to devise a scheme for collection of data on the epidemiology of the disease (including systems for assessing MRI results), for use in pursuit of its control or elimination. This idea was well received and it is hoped that this will prove a further valuable step towards reducing the incidence of syringomyelia.

Wider implications

Tackling one disease in one breed of dog (syringomyelia) will involve - is involving - the concerted efforts of many people and organisations. There are research programmes, applications for funding, controversies about the best approaches to adopt and practical implementation of strategy, difficulties of reaching consensus and getting buy-in, and so on. The scale of the challenge is considerable. Multiplying this up to tackle all the potentially tractable genetic welfare problems that have arisen through selective breeding of all companion animals (given the huge range of taxa kept) presents a vast collection of Herculean tasks. It is important that ways are found to address these.

There was general support for the view that, in order to prevent the generation of still further genetic animal welfare problems in the future, selection for specific traits in order to develop new morphs, strains or breeds of companion animals should be strongly discouraged.

CAWC's (2006) 'Welfare and Breeding' Report recommended that animal breeders should familiarise themselves with and respect the following code: *'The selection and breeding of companion animals can result in, or perpetuate, characteristics or*

inherited conditions that seriously affect the quality of animals' lives. No one should breed companion animals without careful regard to characteristics (anatomical, physiological and behavioural) that may put at risk the health and welfare of the offspring or the female parent.'

Next steps

CAWC is keen to assist in driving forward initiatives for tackling welfare problems that have arisen through selective breeding of companion animals. At this workshop various actions were proposed or emerged, including:

- That there seems to be a need for further debate about the relative merits of the three approaches to tackling these kinds of welfare problems (breeding to reduce prevalence or eliminate within the breed, outbreeding to reduce prevalence or eliminate, or ceasing to breed at all from potential carriers).
- That breed clubs and the Kennel Club might work more closely together further to find ways to make more health and welfare information available.
- That scientists studying the epidemiology and genetics of the disease should get together with breed club representatives, facilitated by the Kennel Club, to devise a scheme for collection of data on the epidemiology of the disease (including systems for assessing MRI results), for use in pursuit of its control or elimination.

CAWC will explore ways to facilitate the first of these and looks forward to hearing of timescales for and progress with the second two initiatives and also of progress with other initiatives outlined at the workshop, including: development of genetic tests, development of web-based mate-selection advice, and initiatives for education and provision of better information on health and welfare for prospective owners.

CAWC is looking to help find ways forward for welfare improvements and welcomes feedback and comments from any individuals or organisations that can make constructive contributions. Contact details are at the foot of this document.

CAWC is most grateful to Clare Rusbridge and Sarah Blott who gave very clear and helpful introductions and overviews of syringomyelia in the CKCS and genetic aspects, and to all who participated in the workshop.

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