

Fisher's response to the Animal Genetics Survey 1943

- See Prof J. Gray's Summary of 30 Replies to Circular - J.F. ...

RESEARCH IN ANIMAL GENETICS

Letter A.M.B. - J.H.B.

In J. Gray's file

The amount of institutional space, time and expenditure given to genetics in this country in the past has been so meagre that it is somewhat embarrassing to be asked for a programme touching on the application of genetic research to the breeding of animals of economic importance. It is like being asked for a programme for the development of chemical industry in a country where the majority of compounds and elements are unknown and laboratories do not exist in which they can be recognised or prepared.

For any species of animal or plant to the improvement of which it is hoped that genetics should contribute the first necessity is a centre, or series of centres, at which the species can be maintained for experimental breeding and quantitative and qualitative testing. It is quite true that the early geneticists were unduly optimistic as to the practical application of the small amount of information so far gathered about hereditary factors in each species. Naturally, the early work was confined to factors acting unconditionally on conspicuous characteristics, and these were not of themselves necessarily or usually of practical value. This was, however, the only beginning which could be made and it supplies a foundation which is nevertheless necessary because we now realise that the study of quantitative characters is far more difficult, requiring more elaborate methods, and has been avoided by professed geneticists only by reason of its difficulties and not because its importance, both practical and theoretical, was not obvious.

It seems to me essential that a centre for genetical research on any species should collect and maintain all the factors known in that species, apart from factors of purely pathological interest, difficult to maintain in normal stocks. Such material is, I believe, ideally maintained in segregating inbred lines such as, working unsystematically, I have shown to be possible with mice. An adequate selection of such lines appears to me indispensable for expeditiously analysing new material in respect of all known factors as a preliminary to locating and studying any new genetic peculiarities it may possess. The advantages for academic genetic research of this procedure are:

(1) It is only in segregating inbred lines that the effects of specific characters can be manifested without disturbances due to other genetic differences. They are therefore indispensable for the teaching of students, and the preparation of museum material demonstrating such differences.

(2) They provide the means of analysing organisms of unknown genetic composition.

(3) They provide perpetual standards of comparison available for quantitative studies.

I stress this point of the maintenance of known factors because there seems to be a danger that the realisation of the inadequacy of the point of view of the early geneticists should lead to neglect to use what they have in fact accomplished.

With respect to applications of economic or other practical importance, it is for geneticists to maintain material and equip themselves with adequate methods, rather than to find the problems, which will always depend on the circumstances of practical husbandry, changes in which can be no more foreseen by geneticists than by any other class. It may be foreseen however that facilities for testing quantitatively the performance of individuals in numbers will be essential in any field, and one would like to look forward to a stage at which the maintenance, testing, and selective improvement of elite stock of each species should be the care of geneticists. The existence of elite stock showing superior performance in objective quantitative tests is the prime necessity in any programme of the improvement of farm animals, whether this improvement is effected by the sale of superior sires or through the medium of an organisation for artificial insemination. Neither method would improve the livestock of the country unless the pedigree material used in its improvement is genuinely and objectively superior for the purposes and in the conditions in which the stock is utilised. I should above all emphasize the importance of developing performance tests, and in these an aspect not to be neglected concerns performance in conditions which are <sup>Diverse +</sup> far from optimal.

In 5.6.65  
file

undated but probably about 1945

- J.H.C.

I. Livestock performance tests laboratory

This should be a biometrical laboratory charged with the study and improvement of performance tests, intended to compare and assess the value of farm animals.

Improvement here means an increase in the precision with which each set of observations measures

(a) the economic value of the individual animal in the practical conditions of animal husbandry for which it is designed,

(b) the genetic value of the animal as breeding stock.

Data for such study should be obtained from (a) the existing body of published researches and later additions to this, and from (b) provisional standard tests made on elite material maintained at Livestock Selection Centres, and drawn up in consultation with these centres.

II. The Livestock Selection Centres should be charged with the maintenance and improvement of sources of elite stock suitable for the needs of the areas they serve. Their policy should not be controlled by the Performance Test Laboratory, but they should owe the duty to record the observations and perform the tests required by the latter. They should also maintain such standard stocks, known genetic factors, inbred lines, etc.,

as the Performance Test Laboratory may need for the assessment of the success of any selection programme adopted, and for the study of means to its improvement. They should be responsible for specifying and carrying out their selection procedure with experimental precision, irrespective of commercial profit, and for supplying their records for study to the Performance Tests Laboratory.

Such centres may handle one type of animal only, or more than one, according to the facilities available and the needs of their areas. They should, where possible, be associated with centres for agricultural education, with veterinary research, or with artificial insemination units, but should in any case have an independent personnel. It is important that the stock should come under the observation of a qualified geneticist, but until more such are available, it would be useless to require such a qualification in the director.

Presumably about twenty such Centres will be required. Provision must be made in advance for the regular expansion of each over an initial period of fifteen years, by which time they could be properly staffed and capable of taking advantage both of theoretical genetic knowledge, and of the practical experience needed for its application, which the initial period is intended to provide.