PROGRESS IN THE STANDARDISED GENETIC NOMENCLATURE IN SHEEP AND GOATS

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SUMMARY

The origin of the Committee on Genetic Nomenclature of Sheep and Goats (COGNOSAG) is described. The development of guidelines for naming genes and karyotypes and the working procedures of the Committee are outlined. Lists and summaries of the following loci have been published to date: visible traits other than colour in sheep (40 loci) and in goats (7 loci); blood and milk polymorphisms in sheep (40 loci) and in goats (14 loci). Colour and pattern loci in both sheep and goats will be published in 1990.

INTRODUCTION

Although there have been earlier attempts to organise genetic nomenclature for sheep and goats (reviewed by Lauvergne, 1984), the present concerted effort has been undertaken by the Committee on Genetic Nomenclature of Sheep and Goats (COGNOSAG). The origins of COGNOSAG go back to the National Congress on Breeding Coloured Sheep and Using Coloured Wool held in Adelaide, South Australia in 1979. At this meeting, two aspects emerged: (i) the naming of colour genes in sheep was confused and unsatisfactory as far as the geneticists present were concerned, and (ii) the upsurge of interest in the colour and pattern variants in sheep which had resulted from the commercial demand for naturally-coloured wools in the craft industries required the establishment of a systematic and generally accepted nomenclature for the colour genes in sheep.

Further discussion suggested that the second in the series of congresses on Coloured Sheep to be held in New Zealand in 1984 would present an opportunity to further the project. Consequently, A.L. Rae who was a member of the Programme Committee of the Congress asked J.J. Lauvergne to prepare an introductory review to focus attention on the main issues involved. This review (Lauvergne, 1984) was discussed at a meeting at Massey University during the World Congress on Coloured Sheep and their Products, the establishment of COGNOSAG being agreed. The foundation committee members were: S. Adalsteinsson (Iceland), T.E. Broad (N.Z.), Melinda Jane Burrill (U.S.A.), C.H.S. Dolling (Australia), P. Hoogschagen (Netherlands), J.J. Lauvergne (France), R.S. Lundie (N.Z.), A.R. Quartermain (N.Z.), A.L. Rae (N.Z.) and G.A. Wickham (N.Z.).

THE OBJECTIVES OF COGNOSAG

The most important objective of the Committee is to establish rules for naming of identified genes in sheep and goats, and to review these rules whenever this may be required by advances in knowledge of the genetics of the two species. Further objectives include publishing and circulating lists of loci, alleles and chromosomal variants; listing breeds and lines which carry identified genes and chromosomal variants and giving information about the location of these stocks; identifying breeds, types and lines which warrant genetic evaluation and preservation and to foster training of research workers to undertake this work; collaborating with other organisations which have related interests.

PROGRESS MADE

The Committee has organised four workshops, the first three (in 1986, 1987 and 1988) being held near Manosque in the Department of Alpes-de-Haute Provence in France and the fourth at Eugene, Oregon in 1989.

At the 1986 Workshop, after consideration of material in Lauvergne (1984) and Searle (1988), a set of rules for genetic nomenclature in sheep and goats was agreed for further discussion with other scientists working in sheep and goat genetics. Two main models for gene nomenclature exist. One is from the genetics of the mouse which had its origin in 1940 (Dunn et al, 1940) with subsequent revisions. The other, applying to human genetics, was standardised in 1979. After much discussion, the Committee opted for an intermediate solution which tends to adhere more closely to the mouse model. This came about mainly because of the presence in the mouse of many variants (especially the colour and pattern genes) which have homologies with the sheep. This draft was revised at the 1987 Workshop to take into account constructive comments from members and others, especially on the need to achieve better conformity with the already established nomenclature for biochemical polymorphisms.

In 1986 it was decided to include goats in the programme of work, mainly because of their close genetic relationship to sheep and because they produce fibres which have complementary uses to wool. It was also decided that for the initial work it was convenient to consider three categories of genes in sheep and goats: those controlling colour and pattern; those controlling other visible traits and those controlling biochemical polymorphisms. A further category included chromosomal anomalies.

The structure of the programme of work which evolved in each of these categories was as follows:

(i) Preparatory reviews of the literature were presented for general consideration (see COGNOSAG, 1988).

(ii) A convenor and sub-committee were appointed for each category. The convenors of the sub-committees were: colour and pattern genes in sheep, D.P. Sponenberg; visibles other than colour in sheep, C.H.S. Dolling; colour and other visibles in goats, P. Millar; biochemical polymorphisms in sheep and goats, Elizabeth M. Tucker.

(iii) Each sub-committee then produced a chronological listing of the references describing the locus or allele, an assessment of the evidence contributed by each reference to knowledge of the inheritance of the allele, a brief statement of the gene effect and the class to which it belongs and comment on any known homology with loci in other species. Finally, the name and symbol for each locus and allele used in each reference was noted and a proposal made by COGNOSAG of the name and symbol for use when referring to the locus and its alleles.

(iv) Opportunity was then made for others outside the committee to comment on the proposed locus and allele names and symbols. Suggestions were received and alterations made at the next year's Workshop and then published thereafter.

The progress which has been made can be summarised as follows:

Workshop 1986 - The proceedings of this first workshop were published in 1988 (COGNOSAG, 1988) and included the first proposal for rules for gene nomenclature in sheep and goats. It also included the reviews of the categories of genes

chosen for working purposes. Rules for karyotypic nomenclature in sheep and goats were also presented.

Workshop 1987 - The proceedings of this workshop were published in 1989 and include the revised rules for gene nomenclature and the summaries of visible traits other than colour in sheep (40 loci), blood and milk polymorphisms in sheep (40 loci), visible traits other than colour in goats (7 loci) and blood and milk polymorphisms in goats (14 loci). The rules for gene nomenclature have also been published in an appendix in Rae et al. (1989).

Workshop 1988 - The proceedings of this workshop which includes the colour and pattern genes in both sheep and goats finally agreed at the 1989 Workshop in Eugene, Oregon, is in the hands of the printer and will be published in 1990.

DISCUSSION

The progress made has not been rapid. This has been partly the result of the length of time between workshops to allow for comment to be received from workers who were not members of the Committee. Also, members of COGNOSAG could only give a limited time each year because of their other commitments. There were also unavoidable delays in publication.

Nevertheless, the COGNOSAG members have found the procedures outlined above to be sound and workable. The experience gained has been valuable and at the 1989 Annual General Meeting, the members expressed their willingness to assist any other group intending to undertake similar work with other species of livestock.

Some observations which may be of assistance to other groups are: (i) Clearly, it is essential to have adequate financial support to organise the workshops and other procedures outlined earlier and to ensure that they are supplied with secretarial and other staff; (ii) It is also crucial to have the assistance of a good publishing service. COGNOSAG is greatly indebted to the Bureau des Ressources Génétique, Paris, and of Lavoisier for these services.

COGNOSAG still has some unfinished work in the first round of its operations. Information on the sources and location of different genetic variants, strains and breeds has not yet been compiled. Future operations also include an on-going review and updating of the lists of loci and alleles to take into account new research information as it comes available.

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