

New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](http://creativecommons.org/licenses/by-nc-nd/4.0/).



You are free to:

Share— copy and redistribute the material in any medium or format

Under the following terms:

Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for [commercial purposes](#).

NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

whereas in the wool game we are up against all sorts of features, some of which can be measured, and some of which we can only guess at, and some of which appear to be entirely variable. We can measure such things as gross yields, and so on, but things like soundness, colour, and so on, are very difficult to estimate in progeny testing, or survey work. We are up against a host of difficulties which you in the dairy industry do not encounter.

DR. DRY: Regarding fleece weight: I have just an arithmetical hint that there is a relation between birth weight and fleece weight. I have watched my lambs pretty faithfully, but I have not always watched my fleece weights so faithfully. However, I have a hint that there is that relation. I do not know whether anything can be done towards raising the birth weight to lift the fleece weight. Is there any further information on that?

DR. McMAHON: I do not know of any specific information. We have a vast quantity of information from the Kirwee Experimental Farm of that type, which will be analysed in due course.

CONGENITAL PHOTOSENSITIVITY IN SOUTHDOWN SHEEP
A New Sublethal in Sheep

Summary of a paper

by

J.J. HANCOCK & E.G. BASSETT, RUAKURA ANIMAL RESEARCH STATION.

A description of the symptoms of the disease Congenital Photosensitivity in Southdowns has been given and the aetiology discussed.

Evidence from a breeding experiment designed to investigate a possible genetical influence has strongly supported the theory that this condition is inherited as a simple Mendelian recessive.

Possible means of eradication of the disease from Southdown flocks in New Zealand have been discussed.

A full account of this work will be published elsewhere.

REFERENCES:

- Cunningham I.J., Hopkirk, C.S.M., and Filmer, J.F. (1942).
Photosensitivity Diseases in N.Z. - N.Z. J. Sci. & Tech. Vol.
XXIV, No. 4A, 193A.
Clare, N.T. (1945) IV - The Photosensitising Agent in Southdown
photosensitivity. N.Z. J. Sci. & Tech. Vol. 27, No. 1, 23-31.

DISCUSSION ON MR. HANCOCK'S AND MRS. BASSETT'S PAPER:

MR. RANSTEAD: Mr. Hancock has been doing much the same work as I have been doing, although I have been doing mine accidentally, and he has been doing his with a purpose. The idea of keeping a small nucleus would be rather difficult to put into operation. If you had 30 odd factors, it would mean keeping 30 odd nuclei, which would be rather expensive, but still if we are going to use artificial insemination widely something will have to be done.

MR. CLARE: I am very glad to see the definiteness of the results Mr. Hancock has achieved at this stage. Regarding the growth, and so on, of the Southdowns: when we were holding a few at Wallaceville, we kept them inside nearly all the time, and, on the whole, they did not prosper very well. I gathered from Mr. Hancock's remarks that as long as they are kept out of the sun, the animals do quite all right. Is that so?

MR. HANCOCK: That is correct. It is easy enough to rear lambs which are out of heterozygous ewes, as these ewes are already used to indoor conditions; it is more difficult when it comes to rearing a lamb out of a normal ewe, in which case the ewe has to be put into the shed together with the lamb. The ewe would like to go out into the field to graze during the day, but that cannot be allowed; instead she has to be kept inside and be fed on dried grass and concentrates. Such a ewe is likely to go off her feed altogether. These lambs frequently do not thrive, as the ewes dry off sooner than normally. But I do not think we have lost any such lambs.

MR. CLARE: I was interested in the slide showing the animal sent up from Wallaceville. That is the animal we used to call "Max". He used to be a bit of a nuisance. I gather he has his moment when he wanders into the sunlight and becomes a little photosensitive. When he was about a year old, I had occasion to expose him through a sheet of plate glass in one of our experiments. We exposed him for five minutes, and he showed his first signs of photosensitivity after three minutes. We gave him five minutes and covered him up; and then exposed him again, and within two minutes he was scratching pretty badly. We thought we would not punish him any further, and put him away, but we found we had punished him fairly severely, and he was in a real mess, with swollen ears, and so on. I was interested to know that now he is an older sheep he can wander about the fields if sufficiently tempted.

MR. McLEAN: This condition was first described in New Zealand by Mr. Leslie in about 1933. It was not then recognised as photosensitivity. It was described by him, actually, as an incurable form of dermatitis occurring in Southdowns. I can quite understand Mr. Hancock's difficulty in keeping these animals alive, because when that character did appear in Southdowns at the College, we tried to keep them for breeding purposes, but they persisted in dying. Another point of interest is that, as far as I am aware, the character has never appeared in our Southdowns since about 1934.

MR. SWAN: Has Mr. Hancock any explanation to offer of the fatty liver observed in some of the lambs? Was it starvation fatty liver, or just a relative starvation because they were off their feed for some time due to their photosensitivity?

MR. HANCOCK: I would refer that question to Dr. Cunningham who carried out the liver examination of those lambs.

DR. CUNNINGHAM: Dr. Hopkirk did the examination. There are one or two points of interest. At first it seems that Mr. Hancock was unlucky with the group of sheep brought from the stud near Hamilton, because in previous years we had at Wallaceville two or three unquestionably photosensitive Southdown lambs; they displayed all the symptoms Mr. Hancock has described and showed an absence of any histolysis in the liver. They were diagnosed as undoubtedly photosensitive, and they came from the same flock as Mr. Hancock has numbered 599. The lamb he showed on the screen, "Max", had a somewhat interesting history. He was derived from the remnants of a flock kept by Mr. Ernest Leighton, who kept a flock of Southdowns as a hobby. About 1931, he had a serious outbreak of what he thought was facial eczema, and a number of the flock were disposed of and only a few kept as semi pets. At the time Maxine, the sister, was born, Mr. Leighton had brought in further remnants of his flock, and then he had brought in a related ram from somewhere else, which showed no symptoms. This ram produced the two affected lambs, whereas the other ram produced no affected lambs, which does support, in a general way, the conclusion Mr. Hancock has reached regarding the recessive nature of the condition. Concerning the manner in which lambs we have kept at Wallaceville have thrived, we have not lost any either, unless they become severely affected, but we did observe that they grew at a somewhat slower rate, and some of them achieved a slightly smaller adult size than might have been expected. We did not take the

same care as Mr. Hancock in rearing them but has Mr. Hancock considered keeping any accurate growth weight records of his South-down lambs? I ask that because the condition of the liver is an extraordinarily interesting one. Mr. Swan might have mentioned it, because he has dealt with it from one angle - that is, to determine the nature of the vessels within the liver by an injection process. It has also been examined by a liver-function test. So far, the only abnormality the liver displays is that it finds difficulty in excreting pigments by reason of the fact that it becomes photosensitive. Mr. Hancock has mentioned the difficulty of excreting Rose Bengal, but that is not the only dysfunction found to occur in the liver. Another effect of the poor functioning of the liver is that it cannot be performing its function in the process of digestion. That is why I want to know whether Mr. Hancock has any reliable growth data.

MR. HANCOCK: I am sorry to say we have no actual data on that point, but, if I could express an opinion it would be to say that these lambs certainly do grow at a slower rate than normal lambs, but I think that may be due to the abnormal conditions under which they are reared.

MR. WHITTLESTON: I was associated with investigating the apparent specificity of the failure of the liver. It seemed to me that the highly specific action in the liver could be inherited without any other things going wrong at the same time. I was interested in the point that only pigments are affected, and the fact that the lambs were not doing so well as normal lambs raises the question, are there any other metabolic processes influenced? but apparently that is not the case.

DR. McMEEKAN: The discussion yesterday following Mr. Ranstead's paper, would tend to suggest that this work of Mr. Hancock's is mainly of academic interest, in view of the fact that under normal breeding conditions, lethals and other recessive factors leading to defects, are of minor importance. I want to suggest that while that is generally true in random breeding populations, as Mr. Hancock has emphasised, it is not going to be necessarily true in the future. In other words, I would re-emphasise Mr. Ranstead's point by two or three examples. It is not going to be true I suggest if any inbreeding or close-breeding is carried on to any degree in this country. To give a specific example: one of the most successful breeders of pigs in N.Z. as measured by his success in objectively measured carcass competitions, is a breeder who has developed a strain of Large Whites that have obtained extraordinarily uniform quality. He has developed that strain by inbreeding. He happens now to be an old man, and it is not likely that his stud will survive in its present location. Accordingly, he offered it to Ruakura about 18 months ago as a means perhaps of perpetuating it which, from his point of view, was really what he was after. Like most breeders, he was interested in ensuring, if he could, the continuation of his work. We were interested, because the fact that he had been inbreeding might give us a flying start in the development of an inbred, uniform strain for experimental purposes. The point is this: that over several generations of close breeding - successive generations of sire, daughter, sister mating - he had no record whatever of any defects appearing in that strain. Incidentally, I believe that this particular breeder is not like some of those quoted by Mr. Hancock - he is reliable. His interest is in pig improvement, and not in making money - he has actually lost money over the years on the job. Mr. Smith is here, and he can tell you that in our first matings at Ruakura with these animals - that is, in the next inbred generation - we have got almost every lethal defect that has been reported in pigs. That is the first point. The second point is this: Mr. Stevens drew attention to the fact that the Romney breed in New Zealand is virtually dependent upon one key stud today, and certain comments were passed in that regard. We have records of the existence of a serious defect in that stud - a defect which results in complete lack of sexual desire in the male, resulting in complete inability to breed in other-

wise normal sheep - in other words, sublethal. It is possible that that defect is inherited - we cannot prove it, because we cannot get access to the parental stock. Now, presuming the key dependence upon that stud, the handling of it in such a way as not to attempt to eliminate that defect by test mating might conceivably mean that it could become of extremely great importance to the Romney breed. A third point is equally obvious - and Mr. Ranstead has mentioned it - the question of artificial insemination; the effect of that method of stock improvement must inevitably, at some stage or other in this country, result in fairly close breeding. I think that is a fair statement. Consequently, I want to suggest that studies of this type, while academic to a point, and academic at the moment, may become of very great economic importance to New Zealand. In that connection, I would ask Mr. Hancock one question: the normal advice which is given to breeders in respect of elimination of defects of this type, is that they should eliminate the parents, both sire and dam, that have been responsible for the production of the lethal individual concerned. That was, I think, the first recommendation he made. In view of the work of Haldane on Eugenics and the relation of culling of individuals within a population of that type as a means of reducing the incidence of a lethal, just what is Mr. Hancock's opinion of that method alone as a means of reducing the incidence? In other words, is that approach sufficient in itself, since it is the usual approach adopted, or is it essential to adopt the test-breeding approach, which is obviously the scientific one, but which, as Mr. Ranstead has suggested, is obviously a difficult one from the practical point of view?

MR. HANCOCK: I think that Haldane refers to human populations. The human population is a random breeding population, and in such a population the elimination of all the homozygotes, and known heterozygotes would cause a very rapid fall in the number of affected individuals born. Some inbreeding occurs even in a random breeding population, and that is the main reason why affected animals do crop up in such a population. But flocks of domestic animals are not always random breeding populations. This applies especially to small flocks and more so to flocks in which the male animals come from a very small nucleus flock. In such cases there will be more inbreeding than in a random breeding population, and the mere elimination of known carriers and affected animals will cause a much slower drop in the number of affected animals.

DR. McMAHON: Regarding Dr. McMeekan's remarks, and with reference to his comment that certain information from a particular Romney flock was not available, I would ask him whether he has actually asked for that information. Presuming that he is talking of the same flock as I am, and I think that is quite certain, we found that the owner of the flock was entirely willing to collaborate in a soundly-based scheme of investigation, and I question whether the suggestion Dr. McMeekan made that that man was like other breeders, would be entirely a true one. So far as we are concerned, that flock was open to investigation.

DR. McMEEKAN: I did not mean to suggest that the man would not co-operate - actually, he is willing to do so, or rather he is willing to consider an approach. Obviously, it is a very ticklish problem, and the suggestion I made originally to him was that we should first of all attempt to get a ram of this type to breed by the use of testosterone, because it would appear that this particular condition is due to a failure of the male sex hormone, and obviously, from a breeding point of view if one could mate (A) sheep with (B) and get such a ram to breed, and then procure female stock to produce that ram it would give Mr. Hancock a "kick off" of a type that would enable him to produce a paper along the same lines as that which he has brought forward today in about the same length of time; otherwise the process is going to be a long one. You will notice how long it took Mr. Ranstead's lethal to appear in a flock in which there was no knowledge of the carrier situation, and so on. At the same

time, I would emphasise that the point is a very ticklish one. Any suggestion that a defect of that type is inherited and exists in any particular flock, is liable to penalize the breeder concerned financially, and one has therefore to be careful - I hope nobody knows where that flock is, by the way.

DR. DRY: In the course of a trip to North Auckland, where I was the guest of the Department of Agriculture in the early days of this work, a breeder had three rams in succession that all turned out to be carriers of this factor. If you always use carrier rams, in four or five generations you would strike a balance in which under 50 per cent. of affected lambs were born in a generation. If you use three in succession, you would very nearly reach that level - one or two under 50 per cent. He had reached a figure of 30 per cent. There would be some over-lap of generations, of course, but his figure of 30 per cent. was so near the theoretical expectation in that sort of breeding, that it was quite an argument in favour of simple inheritance. Has an attempt been made to detect the heterozygotes by some chemical trick? Evidently the heterozygotes can be detected early by injecting a dye. Can anything be done to spot the heterozygotes?

MR. HANCOCK: It is true heterozygotes can be detected long before they become a photosensitive through various liver tests of which the most convenient is the Rose Bengal excretion tests. Normally, a sheep will excrete in eight minutes up to 80 or 90 per cent. of this dye, whereas an afflicted sheep will excrete only about 10 per cent. We ran a series of Rose Bengal tests on known heterozygotes and we could not find any difference in their liver's ability to excrete the dye when compared with normal lambs. So this test failed in detecting heterozygotes, and I do not think any other test has been tried.

MR. McKAY: I understood Mr. Hancock to say that Ram 544 was brought into the flock, and left one ram showing the condition which lived. He later stated that it was a very fortunate occurrence that that ram died, it being shown that its condition was not due to photosensitivity, but to the fact that it had recovered from an attack of facial eczema. If that is the case, how can he explain the occurrence of photosensitivity in Ruakura stock?

MR. HANCOCK: Actually, 599 left several photosensitive lambs, but all those lambs became photosensitive when they were quite of an age - three or four months old - and when they died their livers showed typical facial eczema lesions. From that evidence we came to the conclusion that all those lambs that he had sired that actually became photosensitive later on were facial eczema cases, and not true cases of this congenital photosensitivity. I think it is probably true that 599 did not even carry the factor for the disease in single dose. The only indication that he might have carried the factor would be that one of his daughters, mated to a homozygous ram, actually produced an affected lamb, but this ewe's dam was brought from one of the farms near Hamilton, and it is more likely that she inherited the factor from her dam, because 599 had a great number of daughters in our flock, and this was the only time a daughter of his produced an affected ram. We actually did get at least two ewes from the two flocks near Hamilton which carried the factor, because, in addition to the ewe, just mentioned, another of these ewes herself produced an affected lamb when mated to a heterozygous ram.

MR. CLARE: Were there other facial eczema cases run with these animals left by 599, or does this fact give any ground for suspicion that there was an inheritable tendency to the type of liver damage which occurs in facial eczema. I remember that Mr. Watt some years ago was rather strong on that line, although I do not know what grounds he had for saying it, but he did feel that there was an inheritable tendency. The point is perhaps of interest at the moment, because in some of our re-