



Department of  
Primary Industries and  
Regional Development

## Journal of the Department of Agriculture, Western Australia, Series 3

---

Volume 4  
Number 1 *January-February, 1955*

Article 8

---

1-1955

### Clover disease : Practical Findings and Recommendation for Control

F L. Shier  
*Department of Agriculture*

R C. Rossiter  
*Department of Agriculture*

Follow this and additional works at: [https://library.dpird.wa.gov.au/journal\\_agriculture3](https://library.dpird.wa.gov.au/journal_agriculture3)

---

#### Recommended Citation

Shier, F L. and Rossiter, R C. (1955) "Clover disease : Practical Findings and Recommendation for Control,"  
*Journal of the Department of Agriculture, Western Australia, Series 3: Vol. 4: No. 1, Article 8.*  
Available at: [https://library.dpird.wa.gov.au/journal\\_agriculture3/vol4/iss1/8](https://library.dpird.wa.gov.au/journal_agriculture3/vol4/iss1/8)

This article is brought to you for free and open access by the Agriculture at Digital Library. It has been accepted for inclusion in Journal of the Department of Agriculture, Western Australia, Series 3 by an authorized administrator of Digital Library. For more information, please contact [library@dpird.wa.gov.au](mailto:library@dpird.wa.gov.au).

# CLOVER DISEASE

## Practical Findings and Recommendation for Control

By F. L. SHIER, Superintendent of Wheat Farming, and R. C. ROSSITER,  
Principal Research Officer, Division of Plant Industry, C.S.I.R.O.

**D**URING the past decade an infertility in ewes together with other breeding troubles and abnormalities of the sex organs of sheep became a serious problem in certain regions in Western Australia where pastures were composed predominantly of early (Dwalganup) subterranean clover.

Briefly the manifestations were infertility, or failure of ewes to get in lamb; dystocia, a condition affecting ewes which had conceived but which made little or no attempt to deliver their lambs and failed to do so; and prolapse and inversion of the uterus (turning inside out of the womb), which occurred typically in the spring, some months after the lambing season. The infertility resulted in a progressive decline in lambing which could, in the course of a few years, fall to below 20 per cent.; the dystocia resulted in death of the unborn lamb and a ewe mortality or wastage of up to 30 per cent.; while prolapse could lead to a 10 per cent. wastage.

Other manifestations were lactation in unbred ewes and in wethers. Wethers also died from urinary obstruction—a small percentage showed a “false bladder” visible externally as a large fluctuating swelling in the crutch; this was almost invariably fatal.

In the March 1946 issue of the Journal of the Department of Agriculture of Western Australia, an account was given of the various manifestations of this disease, the extent of the problem, the knowledge obtained up to that time, together with a number of practical suggestions which it was felt should tend to minimise the overall effects of the disease and keep the total productivity of affected properties somewhere near their normal level.

Since then an intensive investigation has been continued by a team of workers into the pathological, chemical, agrostological and field aspects of the disease. A considerable body of scientific data and a much better understanding of the whole problem has been obtained. Many points still re-

main obscure and it would appear that much further patient investigation and experimentation will be necessary before this very complex problem, which has resulted in high losses on some properties and at one time appeared to threaten the sheep industry of the 20-25 inch rainfall area of this State, is fully understood.

The more scientific findings have been published by several workers in technical journals from time to time and these have been listed at the end of this article. Here it is proposed to deal only with those points which have a bearing on the practical side of the problem and its control in the light of present knowledge, in the form of a non-technical publication for the general guidance of farmers. This has been considered desirable in view of the additional scientific data now available. It should be pointed out, however, that although we are far from a complete understanding of all aspects of the problem, present experimental data strongly supports the broad general recommendations made in the article.

This article has been prepared by the authors in collaboration with other members of the W.A. Technical Committee on Sheep Infertility.

### PRESENT KNOWLEDGE—PRACTICAL ASPECTS

1. The disease is of nutritional origin. It is not due to any infectious organism or the toxins produced by bacteria and eaten by sheep and consequently control cannot be expected by the development of an immunising vaccine such as is the case with enterotoxaemia (braxy-like disease) or botulism (toxic paralysis).



2. The disease results from the grazing of subterranean clover dominant pastures. It has been shown that the clover contains a potent substance, genistein, which has an action on the sheep identical with that of one of the sex hormones, oestrogen. The sex hormones are chemical substances produced, normally, by certain glands in the animal body. They severally control and maintain the various reproductive processes and organs. The continued preponderance of one type of hormone, resulting from the ingestion of potent clover, completely upsets the hormone balance controlling the various reproductive processes. This also induces gross abnormalities in the sex organs of the ewe, notably a cystic condition of the uterus. Wethers are also affected to a lesser extent.

3. The effect of this green subterranean clover grazing is progressive, in the case of ewes. Some cystic condition of the uterus (womb) has been demonstrated in ewe weaners after their first season on green subterranean clover. The degree to which these young ewes have been affected is not great, but it is apparently sufficient to reduce fertility somewhat at their first mating 12 months later, even if they were not on a dominant clover diet during their second winter and spring.

Two seasons of green clover grazing are sufficient to have a distinct effect on the fertility of ewes when mated as two toothed and some incidence of dystocia frequently occurs at lambing time. Maiden four-tooth ewes (mated at two and a half years) following three seasons on green clover are markedly affected, showing definite infertility and generally a high degree of dystocia at lambing of those ewes which had conceived.

4. These effects on the sex organs and fertility of the ewe are largely permanent. Maiden four-tooth ewes and infertile six-tooths (which had not produced a lamb at their first mating) from an affected property exhibited the major manifestations of the disease (infertility and dystocia) at three successive matings on a "sound" area (Merredin) where there was no subterranean clover grazing.

5. The clover appears to be highly potent throughout the green growing period but there is a rapid fall in potency after wilting.

Dry clover and clover hay have been found to contain very low amounts of the potent substance, genistein, and can be consumed by ewes and wethers with impunity.

6. Factors influencing the production of the potent substance in subterranean clover have been studied extensively. It appeared possible that genetic or environmental factors might influence potency, and that if so the disease might be controlled by the use of other (non-potent) varieties of subterranean clover or, for example, by appropriate manurial treatment of the soil.

The evidence strongly suggests that, in the West Australian environment at any rate, all varieties of subterranean clover wherever grown will be dangerous in the green stage, and that sheep will develop "clover disease" if they have a dominant ration of such material for a sufficiently long period.

7. The other plant species of the affected region such as oats, Wimmera ryegrass, volunteer annual grasses, capeweed, *Erodium* and small "native" clovers even in the green stage, do not contain sufficient genistein to produce harmful effects. On a mixed pasture sheep are less likely to become affected with the disease because of the reduced consumption of subterranean clover.

8. Adequate dressings of superphosphate, in addition to providing good pasture production, will eventually reduce clover dominance owing to the ingress of volunteer (non-clover) plants such as capeweed, brome grasses, etc. Conversely, insufficient phosphate will prolong clover dominance.

9. It appears extremely unlikely that the sudden onset of the disease in the early 1940's was due to any direct effect of war time superphosphate—such as an excess (as an impurity in the superphosphate) or deficiency of a particular element causing the production of the potent factor in clover. The reduced amounts of superphosphate available for topdressing at that time may have tended to produce more dominant clover pastures indirectly, by reducing the overall productivity of the pastures which in turn results in heavy grazing pressure by the sheep.

10. Rams are unaffected. This is no doubt due to the counteracting effect of



the male sex hormone (testosterone), produced by the testicles, which is antagonistic to oestrogen. The effect of testosterone injected into wethers, grazing potent pastures, has been demonstrated experimentally.

The high cost of this substance and other practical considerations, however, absolutely preclude its use for the control of "clover disease" in any of its manifestations.

11. Although earlier evidence from some properties suggested that crossbreds were less susceptible to infertility and dystocia, than were Merinos, recent experience indicates that the former are equally affected. It is quite definite that the changing over to crossbreds cannot be recommended as a means of controlling the disease.

12. Cattle and horses bred and maintained on affected properties have shown no evidence of "clover disease."

### CONTROL

It is evident that sufficient information has been accumulated to suggest a system of farm and sheep management which should give a considerable measure of control of "clover disease." This must be based, obviously on measures designed to prevent sheep from regularly eating excessive amounts of green subterranean clover. In recent years many farmers have developed more mixed pastures for their sheep in order to avoid dominant green clover grazing. This has (quite naturally) produced no beneficial effects on their older and "affected" sheep, but farmers who had previously suffered severe losses in their breeding flocks from this disease report marked improvement in their younger sheep which have been maintained under the modified system of management recommended. A very significant feature of the field evidence in the last two years has been the general low incidence of dystocia and prolapse even on properties which had suffered severely in the past.

If we accept the evidence that the genetic content of green subterranean clover is not materially influenced by variety or soil, then obviously the only means of control of the disease short of completely removing the clover is by pasture and sheep management.

For a number of reasons which need not be discussed in this article, subterranean

clover is likely to remain an essential component of the pasture if a sound system of agriculture is to be maintained over the region under review. Further research work on the problem is necessary for a complete understanding of the many at present obscure scientific aspects of the problem. Whatever the results of these investigations it is strongly contended that appropriate modifications of husbandry practices, even if not 100 per cent. effective, will undoubtedly result in a much more productive system of farming with greater total returns than have been obtained on farms in the past where sheep have been grazed on more or less dominant pasture periodically topdressed with superphosphate.

### PRACTICAL RECOMMENDATIONS

1. Dominant clover pastures should not be grazed in the green period. Such grazing can produce permanent effects in ewes and result in some ill-health and possible losses in wethers. Clover dominant paddocks can be reserved for summer grazing, but are best utilised for meadow hay.

2. If the lambing percentage of a particular flock has dropped to very low figures, say 10 to 15 per cent., it is inadvisable to continue breeding from such ewes. The small percentage of lambs would be more than offset from possible losses from dystocia. It would be best either to keep them unmated solely for wool production or to sell them on the fat stock market.

3. Where the lambing percentage is about 40-50 per cent., it is suggested that at each tailing time all dry ewes be suitably raddled and later mated separately. Those which fail to lamb after this mating, that is after two consecutive matings, should be culled from the breeding flock and disposed of as indicated above. One farmer, by such a programme, associated with appropriate pasture management, has improved his lambings from 30-35 per cent. to a normal 70-75 per cent. for the two lambings subsequent to culling.

4. A system of ley farming together with adequate applications of superphosphate should be instituted on clover dominant areas with the dual objective of obtaining greater total productivity and a more balanced grazing for the stock. Wheat is very profitable at the present time and in most affected districts could be used as



the first crop. This may be followed with advantage by a "scratched in" crop of oats and Wimmera ryegrass using the sunder-seeder or combine, and would provide a large bulk of good mixed winter and spring grazing. If the paddock is not grazed too heavily in late spring and early summer ample Wimmera ryegrass seed should be set to provide a good pasture in the following year.

5. Pasture improvement should be energetically pursued throughout the clover areas. This should include the introduction and encouragement of species other than clover, such as Wimmera ryegrass. Good management of the pastures should be followed with attention to such items as topdressing, the avoidance of over-grazing, particularly during the seed setting stage of the grasses, and periodic renovation with the use of "scratched in" crops of oats.

6. Baby beef production, based on such breeds as the Aberdeen Angus, Red Poll or Beef Shorthorn, could be developed with distinct advantage as one of the activities on many farms at present carrying only sheep.

#### TECHNICAL PAPERS ALREADY PUBLISHED

1. Bennetts, H. W., Underwood E. J. and Shier, F. L.—"A Specific Breeding Problem of Sheep on Subterranean Clover Pastures in Western Australia."—*Vet. Journal* Vol. XXII Feb. 1946.

2. Bennetts, H. W.—"Metaplasia in the Sex Organs of Castrated Male Sheep Maintained on Early Subterranean Clover Pastures."—*Aust. Vet. Journal* Vol. XXII June 1946.

3. Bennetts, H. W.—"A Further Note on Metaplasia in the Sex Organs of Castrated Male Sheep on Subterranean Clover Pastures."—*Aust. Vet. Journal* Vol. XXII Jan. 1947.

4. Curnow, D. H., Robinson, T. J., and Underwood, E. J.—"Oestrogenic Action of Extracts of Subterranean Clover (Dwalganup)."—*Aust. Jour. Expt. Biol. & Med. Sc.* Vol. XXVI 1948.

5. Schinkel, P. G.—"Infertility in Ewes Grazing Subterranean Clover Pastures."—*Aust. Vet. Journal* Vol. XXIV 1948.

6. East, June, Underwood, E. J., and Bennetts, H. W.—"Oestrogenic Effects of Subterranean Clover (Dwalganup): Protective Action of Androgen in the Castrate Male."—*Aust. Journ. Expt. Biol. & Med. Sc.* Vol. XXVII 1949.

7. Robinson, T. J.—"Oestrogenic Potency of Subterranean Clover (Dwalganup): The Preparation and Assay of Abstracts."—*Aust. Journ. Expt. Biol. & Med. Sc.* Vol. XXVII 1949.

8. East, June.—"Oestrogenic Effects of Subterranean Clover (Dwalganup): Mammary Development in the Castrate Male."—*Aust. Journ. Expt. Biol. & Med. Sc.* Vol. XXVIII 1950.

9. Bennetts, H. W., and Underwood, E. J.—"The Oestrogenic Effects of Subterranean Clover (Dwalganup): Uterine Maintenance in the Ovariectomized Ewe on Clover Grazing."—*Aust. Jour. Expt. Biol. & Med. Sc.* Vol. XXIX 1951.

10. Beck, A. B., and Braden, A. N.—"Studies on the Oestrogenic Substance in Subterranean Clover (Dwalganup)."—*Aust. Journ. Biol. & Med. Sc.* Vol. XXIX 1951.

11. Underwood, E. J., and Shier, F. L.—"The Permanence of the Oestrogenic Effects of Subterranean Clover Grazing on the Ewe."—*Aust. Vet. Journal* Vol. XXVII 1951.

12. Alexander, G., and Watson, R. H.—"The Assays of Oestrogenic Activity of *Trifolium subterraneum* L. by Increase in Uterine Weight in the Spayed Guinea Pig."—*Aust. Jour. Agric. Res.* Vol. II 1951.

13. Bradbury, R. B., and White, D. E.—"The Chemistry of Subterranean Clover. Part I: Isolation of Formononetin and Genistein."—*Jour. Chem. Soc.* 1951.

14. Underwood, E. J., and Shier, F. L.—"The Incidence of Oestrus in Ewes Grazing on Subterranean Clover Pastures."—*Aust. Vet. Jour.* Vol. XXVIII 1952.

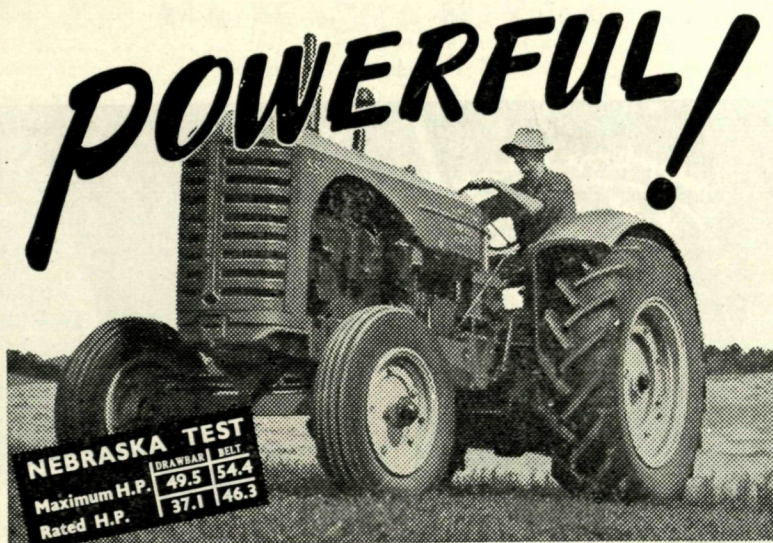
15. Alexander, G., and Rossiter, R. C.—"The Effects of Fertiliser Treatments on the Oestrogenic Potency of *Trifolium subterraneum* L."—*Aust. Jour. Ag. Res.* Vol. III 1952.

16. East, June.—"Oestrogenic Effects of Subterranean Clover: Studies on the Female Guinea Pig."—*Aust. Jour. Biol. Sc.* Vol. V 1952.

17. Braden, A. W. H., and Peterson, J. E.—"The Persistence of Endometrial Cysts Induced by Oestrogen in the Guinea Pig."—*Aust. Jour. Biol. Sc.* Vol. VI 1953.

18. Bradbury, R. B., and White, D. E.—"The Chemistry of Subterranean Clover. Part II: Synthesis and Reduction of Isoflavines Related to Genistein and Formononetin."—*Jour. Chem. Soc.* 1953.





**SUNSHINE  
MASSEY HARRIS**

**55<sup>K</sup>**

On authentic test figures, the 55K is the most powerful wheel tractor on the Australian market, and the best buy for the big farmer

The 55K gives you ample power for the biggest normal farm implements . . . power to work big areas quickly and thoroughly . . . reserve power for tough spots and bad conditions

It gives you true economy on the basis of fuel per acre and long-life engineering. Mr. Basil Henderson, contractor of Donnybrook, writes—"For the load this tractor has handled, I consider it has been most economical. To date, it has worked 4,500 hours and our repair bill has been negligible."

Advanced engineering features include:—Heavy-duty special kerosene engine with replaceable sleeves; full pressure oiling system; battery ignition with automatic spark control; voltage regulator; selective sliding and constant-mesh transmission; hydraulic velvet-ride seat; swinging drawbar; individual or coupled brakes; self-starter

See your Sunshine Agent or write direct for full information NOW!



**H. V. MCKAY MASSEY HARRIS  
PTY. LTD.**

**Cnr. Murray & King Sts., Perth**





**For  
Pest Control  
E605-  
'Folidol'  
and  
Folidust**

**THE ORIGINAL  
PARATHION  
PREPARATIONS**

of  
Farbenfabriken BAYER A.G.  
Leverkusen

Please mention the "Journal of Agriculture, W.A.," when writing to advertisers