

## POISONING OF SHEEP BY SOLANUM CINEREUM.

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EARLY during the present year, Mr. Stock Inspector White of Merriwa, forwarded a dried specimen of a plant locally known as "Wild Tomato," to the Chief Inspector of Stock, Sydney, for the purpose of ascertaining what was known concerning it. The plant was suspected by a stock owner in the above district of causing, on more than one occasion, the death of a number of his sheep. A specimen had previously been sent to the Government Botanist, Mr. J. H. Maiden, who identified it as *Solanum cinereum* and stated that it was a native plant, its popular name being "Narrawa Burr." It had spread a good deal during the past few years and to such an extent that several Shires had proclaimed it a noxious weed. He had no knowledge of its being poisonous to stock but suggested that as it belonged to the Solanaceæ, which includes some undoubtedly poisonous species. Veterinary opinion should be sought on the subject.

As a result of correspondence after the experiments to be described had been completed, Mr. White stated that odd plants were to be found in the Merriwa district, but it is only on certain holdings that it is growing in any quantity and here it is becoming somewhat of a pest. Prior to the above incident, he had never heard of the plant being suspected of poisoning stock. Some sheep had at times died mysteriously, but death had usually been attributed



to other plants, *e.g.*, *Euphorbia Drummondii*. Sheep do not feed willingly on the plant, rarely touching it when other food is available; but they will eat it when other food is scarce or dry. On the particular station whence arose the enquiry, there was plenty of dry grass in the paddock where the deaths had occurred, together with a fair amount of *Solanum cinereum*. Only some of the sheep had been eating the fruits of the latter and nibbling at a few of the leaves. Numbers of sheep did not touch either fruits or leaves. The former are generally eaten ripe.

In the case causing the enquiry, there were 1,100 sheep in a particular paddock, and of these 45 died. It was not known what time had elapsed between the first eating of the berries and the commencement of the mortality, but some sheep had been observed eating them two or three weeks before any dead sheep were found. Thirty sheep, however, died, apparently suddenly and quietly, within a few days of each other, from what appeared to the owner to be the result of eating the fruits of the plant later on identified as *Solanum cinereum*. The reasons for this conclusion were that the fruits had been eaten off plants growing in the paddock, and also, when being yarded, the sheep were again observed to do the same thing. The same class of sheep in an adjoining paddock had not touched either leaves or fruits of the plant and no deaths had occurred. The owner also considered that this occurrence presented the same features as were noticed in connection with some previous losses, and which he also thought to be due to the same plant.

In order to experimentally ascertain whether *Solanum cinereum* was toxic or not, Mr. White was requested to forward a consignment for that purpose. About 10 lbs. of the dried mature plant were received, each plant carrying many fruits, but the latter were also quite ripe and



dried up. Although these had a far different appearance to the ripe juicy fruits that the sheep had been feeding on, it was resolved to carry out some feeding experiments with them.

The botanical description of *Solanum cinereum* is given in Bentham's "Flora Australiensis," vol. iv, p. 460.

#### **Feeding Experiments with *S. cinereum*.**

*Sheep No. 100, aged 2 years.*—Noon 15th, May '22. Administered by mouth 8 ounces of solanum berries (dried) mashed up with water to form a pulp. The animal would not swallow the mixture voluntarily, but was made to take the lot by placing a little at a time in the mouth and waiting until it had been swallowed.

At 2 p.m. when the animal was inspected, it was apparently well. Having been called away for the afternoon, I left instructions that another dose might be given at 4 p.m. if necessary. The animal, however, died at 3.30 p.m. during my absence,  $3\frac{1}{2}$  hours after the fruits were administered.

Post mortem examination was made next morning. There was some evidence of salivation and diarrhœa. The liver, kidneys, abomasum and intestines were deeply congested. A number of sub-endocardial hæmorrhages were present. No other lesions were seen.

Owing to the rather unsatisfactory conclusion of this experiment, it was resolved to repeat it, and in order to avoid any suggestion that death may have been hastened by some of the liquid going "the wrong way," it was decided to give the berries whole and free from water.

*Sheep No. 101, aged 2 years.*—10 a.m., 16th May, '22. Fed with 4 ounces whole, dry berries (96 in number) of *S. cinereum*. The fruits were simply placed in the mouth of the animal, a few at a time. The mouth being lightly held



until the animal had swallowed them. The result was negative; not the slightest sign of inconvenience being seen.

4 p.m., 16th May, '22. Administered the same weight of dry, intact fruits (93 in number) in the same manner as at 10 a.m., making a total weight of 8 ounces within six hours. The result was again negative.

In view of the above negative results and the positive result obtained with Sheep No. 100, although in one case the whole amount of fruits was given at one time, whilst in the other it was given in two lots with an interval of six hours, it was for reasons to be discussed later, decided to give sheep No. 101 the total amount of 8 ounces of berries emulsified in water. The following are the details.

Noon 22nd May, '22. Sheep No. 101 given by the mouth, 8 ounces of *S. cinereum* fruits (266 in number) mashed up with water. The emulsion forming a thick pulp.

2 p.m. 22nd. The animal which normally was very wild, had now become very quiet and easy to handle without assistance. Respirations were stertorous and rather heaving. Temperature 103° F. Slight salivation, mucous membranes intensely congested. Fæces pultaceous.

4 p.m. Temperature 164° F. Pulse 102 and bounding. Respirations 80 and heaving. Profuse salivation. Moderate dilatation of the pupils, mucous membranes cyanotic. A massive and pultaceous motion. Animal able to stand but very weak and easily pushed over. Perspiring freely. Some eructations of gas from the mouth.

7 p.m. Animal dead. There had been some struggling at various intervals and a profuse, foetid diarrhoea prior to death. Death occurred seven hours after the administration of the berries.



Post mortem examination was made next morning. The sub-cutaneous vessels and peripheral lymphatic glands were congested. About 100 c.c.s of blood stained, turbid liquid in the peritoneal cavity. The spleen showed a number of subcapsular hæmorrhages. The liver was moderately and the kidneys intensely congested. The latter having a number of small hæmorrhages in the cortex. The mucous membrane of the abomasum and intestines was also greatly congested, with a considerable amount of mucus on the surface. The lungs were normal. Pericardium distended with a turbid, blood stained liquid. Numerous sub-endocardial hæmorrhages.

#### Remarks

On account of the difficulty of administering the dried, intact fruits, they were given in two lots of 4 ounces each, with an interval of about 6 hours. The result as noted, was negative.

Six days later, the animal was given the same total amount of fruits, but this time they were emulsified in water, with the result that death took place in seven hours. The question arises, why should the berries when eaten in the dry state be apparently innocuous, whilst the same amount when mashed up with water causes death in such a short period? The probable explanation is that when the fruits were given whole and dry, they were swallowed in the ordinary way, without preliminary mastication and passed into the rumen. Here they would become mixed with the other contents of that portion of the stomach. When rumination took place, the amount of fruits masticated, re-swallowed and passed on to the true digestive stomach, would not only be non-lethal, but insufficient to cause any visible symptoms of poisoning. On the other hand, when the fruits were mashed up in water, only a little of the mash was found in the rumen post mortem.



Furthermore, all the liquid portion of the emulsion containing the soluble alkaloids, would pass direct into the abomasum etc.; consequently, as a lethal dose had reached that part of the alimentary tract where absorption would take place, death occurred rapidly.

Chemical analysis of the fruits is now being conducted by the Department of Agriculture. The result of this has not yet been made known. The clinical evidence however, appears to indicate that the plant belongs to the Solanine group of the Solanaceæ, rather than the Atropine or Nicotine groups, and that the glucosidal alkaloid solanin is the principal active agent.

### Conclusions

The fruits of *Solanum cinereum* contain a poisonous principle, probably Solanin. If the fruits are eaten fresh and in sufficient quantity (at least 8 ounces, and this is not a large amount to ingest at one time), the soluble alkaloid passes directly into the abomasum and will cause death in a few hours. The chief symptoms of poisoning by this plant are, salivation, perspiration, intense congestion of the visible mucous membranes, disordered cardiac and respiratory actions and diarrhœa. In small amounts, however, the fruits do not apparently occasion any pronounced illness. The symptoms shown by the experimental animals, and the post mortem findings, indicate that the principal active toxic agent is Solanin. Dried fruits, even in poisonous amounts do not produce any ill effects unless a relatively large quantity be consumed.

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