Chemical poisoning in animals. 1. Arsenic

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Chemical Poisoning

IN ANIMALS

By H. D. SEDDON, B.V.Sc.

I.—ARSENIC

ARSENIC is poisonous to all animals and to man in quite small amounts and exposure to poisoning is often a result of human carelessness. It is present in many chemical dips used for control of insect parasites on stock, and in agricultural fruit sprays and weed killers whose relative cheapness makes their use economical. However, their potential danger and the economic loss they may cause are a disadvantage.

Poor fencing which allows animals to graze pasture where there is arsenic containing refuse or discarded sheep dip tins are examples of the carelessness which may result in stock losses due to poisoning. Refuse piles, old house or shed sites, unused buildings or the effluent from sheep dips may provide sources of arsenic and cause stock to die suddenly and for no apparent reason.

Sheep dipped in insecticides containing soluble arsenic compounds, may be poisoned by swallowing some of the dipping fluid on plunging in, or by absorption directly through the skin. Absorption by this latter route is much more rapid where fresh skin wounds are present, so that symptoms may occur in sheep lacerated at shearing. However, it is usually where conditions delay drying of dipped sheep that poisoning symptoms tend to appear. This occurs if sheep are dipped when carrying long wool, late in the day, during or just before wet weather, or on yarding close together or in the shade after dipping.

Excessive doses of bluestone arsenic as a drench for the control of internal parasites in sheep may also result in poisoning, especially if carried out a few days after dipping in an arsenical fluid. The arsenic received at drenching is practically all eliminated by the end of one month.

Arsenic is absorbed from the stomach and small intestine where it acts on the lining in a similar manner to a caustic agent. Large doses cause signs of acute poisoning with severe irritation of the stomach intestinal walls causing vomiting, abdominal pain and diarrhoea, followed by collapse, coma and death. The liver may become yellow due to the deposition of fat as a result of toxic changes. Smaller doses produce sub-acute poisoning accompanied by milder symptoms with a more prolonged course which may not result in death.

Chronic poisoning results from the ingestion of many small doses of arsenic over a long period of time and death
sometimes results from accumulation of lethal amounts of the poison in the body.

Arsenic is eliminated from the body in the faeces, urine, milk and sweat. However some forms of arsenic are excreted only slowly and tend to accumulate in the liver, so that successive treatments or accidental ingestion can result in the accumulation of toxic amounts in the animal's body. From the liver, it is slowly distributed to the soft tissues and later is stored and fixed in the bones, skin, hoofs and hair. It cannot be absorbed back into the body from these sites, and is therefore no longer a source of poison to the animal.

The average dose of arsenic necessary to produce death varies with the weight and age of the animal and the form and solubility of the arsenic compound.

**Symptoms.**

In very heavily poisoned animals, symptoms may not be observed prior to death and they may die within an hour of swallowing the arsenic.

*Acutely poisoned* animals show a sudden onset of symptoms and one or more of them are often found dead. Salivation, thirst and a blackish, watery diarrhoea—often blood stained—are present, leading to exhaustion and death. Affected animals become weak in the hind-quarters, stagger and often collapse and are unable to rise. They show muscle tremors and stiffness in the hind limbs and the pulse is feeble and weak. Intense abdominal pain is accompanied by groaning, grinding of the teeth and looking at the flank, with a depressed appetite and milk yield. Acutely poisoned animals often die, even when treatment is given.

*Sub-acutely poisoned* animals show less marked symptoms, and may live for several days. They are off feed and depressed, with a weak and staggering gait. They show apparent paralysis of the hind quarters, muscle tremors and perhaps convulsions. The urine may be blood stained.

A scald due to arsenic may be seen in sheep and pigs where arsenical preparations have been applied to wet skin or to open wounds. The skin shows a scaly appearance with cracking of the skin which becomes inflamed.

Animals which have been chronically poisoned over a long period of time show few symptoms apart from a general unthrifty appearance. There may be indigestion, thirst, a dry staring coat and brick-red discoloration of the lining of the mouth.

On post-mortem, the most characteristic lesions are a rose-red inflammation and blood spots on the alimentary tract, particularly the stomach. The intestinal wall appears swollen and the surface comes away when gently rubbed. There may also be small haemorrhages in the liver, kidneys, heart and lungs. The stomach wall may bleed and ulcerate, and these ulcers may rupture, releasing intestinal contents into the abdominal cavity, resulting in peritonitis and death.

In *cattle and sheep*, inflammation of the abomasum (fourth stomach) is usually pronounced, although in cases where only small amounts of arsenic have been taken, these changes may not be noticeable. The liver may be yellowish due to toxic changes, and the spleen soft. The lining of the mouth is usually swollen and brick-red in colour. Ulcers with deep red bases may be seen on the articulating surfaces of the joints. These occur mostly in the hind limbs and are responsible for a stiff gait and reluctance to move.

In *pigs* the inflammation of the mouth with weeping of fluid may be severe and extend to the lining of the windpipe, resulting in death by suffocation. Inflammation of the stomach wall is also seen.

In *fowls* there is intense inflammation of the gizzard whose horny lining may become separated from its muscular layers. There may also be slight reddening of the lining of the crop and the first loop of the small intestine. The liver is paler than normal.

**Treatment.**

Treatment should be started immediately signs are noticed by moving either the animal or the source of arsenic. In dogs, an attempt should be made to make the animal vomit by giving a strong solution of salt and water. All animals should be given a strong purge to remove the unabsorbed material from the bowel, followed by the feeding of liberal amounts of paraffin oil, egg or milk to prevent
further absorption and protect the lining of the stomach. Drenching with Epsom salts or Glauber's salts dissolved in water will produce purging, a dose of $\frac{1}{2}$ to 1 pound being used with adult cattle or $\frac{1}{2}$ pound with horses, sheep, goats and pigs. These doses should be reduced for young animals and those in poor condition.

In sub-acute cases drenching with sodium thiosulphate (Photographer's "Hypo") within a few hours of the ingestion of arsenic may be successful in saving the animal. A better chance of recovery can be expected where mild symptoms are shown. A dose of 1 to 2 ounces to be dissolved in a half pint of water is advised for horses and cattle, while one ounce is sufficient for adult sheep and goats. These doses should be repeated in 4 to 6 hours if signs reappear. Veterinary assistance should be sought wherever possible.

Animals should be kept quiet and given unlimited water, but no feed for 48 hours. After that period, feed incorporating plenty of good quality hay should be given. However, treatment of acute poisoning is usually unsuccessful as some time has generally elapsed before arsenical poisoning is suspected.

Animals which do recover will show some return of appetite within three days of eating the poison and the diarrhoea will cease in the following week with gradual return to normal health. This may be associated with loss of hair and reduction or termination of lactation in milking cows.

Prevention.

This is essential where arsenical compounds are being used in agricultural control programmes of insects attacking plants or drenching for worms in animals and is largely a matter of care and common sense. Tins which contain or have contained arsenical compounds should be removed from places where animals can gain access to them. Dipping fluids should be disposed of in a safe place, as sheep and cattle often develop a taste for arsenic compounds and will selectively graze contaminated pasture. For this same reason, cattle should not be allowed to graze on patches of weeds which have recently been sprayed with an arsenical weedicide.

Arsenic compounds should be kept out of reach of children at all times.

AUTUMN PREPARATION FOR VEGETABLES

Once again growers are preparing for the autumn, and although much of the plantings have already been carried out, this is a good time to plan for the cool period ahead. The autumn is actually a very good time for vegetable growers, as conditions for the growth of crops are generally excellent.

In the garden, the autumn temperatures are almost ideal for carrying out eelworm control by the use of either shell D.D. or Ethylene-di-Bromide or E.D.B., as it is commonly called. Soil treatment is not highly effective if the soil is either too warm or too cold. For this reason the autumn and spring are the best times to carry out control measures.

Recently many growers have adopted fumigation practices using methyl bromide. This is a highly poisonous gas and great care must be adopted when it is being used. As bean and tomato crops die off, it is suggested that growers fumigate the sticks before putting them away, or else treat them in a formalin dip. Growers using methyl bromide report that they can carry out such routine tasks more easily and that good results are obtained. The fumigation of seed beds has now become regular practice at the Vegetable Research Station, and by this treatment all diseases and pests are readily destroyed. Since seed bed care is of great importance in the production of healthy plants for planting out, the adoption of this practice is suggested to growers as being very worthwhile.

Growers might also consider the planting of a green manure crop within the next few weeks. On local sandy soils the growing of such crops is most useful, and the easiest way in which to return organic material to the soil. As growers tend to rest some of their ground during this time a good way to add an inexpensive improvement is by the use of green manure.

(From a talk given by D. A. Johnston, B.A., B.Sc. (Agric.) and printed with permission of the A.B.C.)