

COWP Boluses for Goats

Goats are given a Copper Oxide Wire Particle (COWP) bolus for 2 reasons:

1. To prevent copper deficiency in areas that are deficient
2. To treat Barbers pole worms (*Haemonchus contortus*)

COWP boluses are capsules with tiny slivers of copper oxide in them the size of iron filings. They float around in the goat's rumen & slowly release the copper. This is the safest way to give supplemental copper in copper deficient areas.

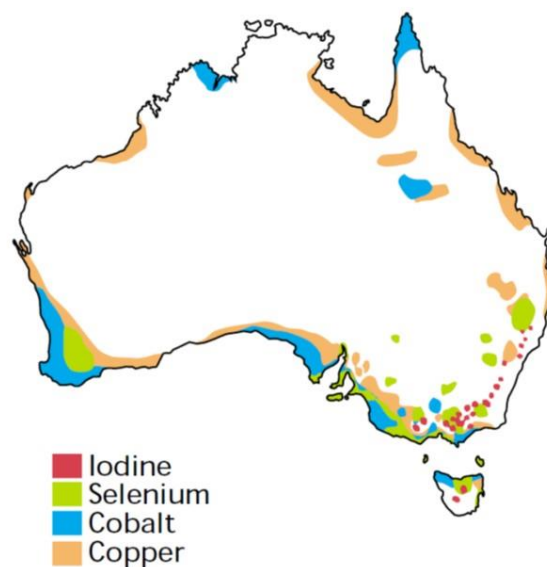


There are a range of products registered for goats in Australia and a search of the government database in January 2024 showed 5 brand names (with pack sizes) which were:

- COPGANE COPPER CAPSULES FOR ADULT SHEEP AND GOATS, RURAL CHEMICAL INDUSTRIES, 100
- TRACERITE COPPER CAPSULES FOR SHEEP AND GOATS, VOLTAR P/L, 50 or 100
- PHARMPLEX PTY LTD MINERITE COPPER 2.5G CAPSULES FOR ADULT SHEEP AND GOATS, 100
- COPPERPLAN 2.5 COPPER CAPSULES FOR ADULT SHEEP & GOATS, BAYER, 100
- COOPERS PERMATRACE COPPER CAPSULES FOR ADULT SHEEP & GOATS, INTERVET, 500

Their labels state that they all should be given no more than annually and have warnings along these lines “Excessive copper is toxic. This product is contraindicated for use unless copper deficiency is confirmed.” Copper deficiency in ruminants grazing the coastal sand soils of Australia have been reported since 1950sⁱ. The clinical signs of copper deficiency in ruminants and goats are: anaemia, poor condition, loss of appetite in adults, fragile bonesⁱⁱ, and incoordination progressing to posterior paralysis in kidsⁱⁱⁱ. Copper is needed to make the haemoglobin in red blood cells. It is also needed to ensure proper development of nerves in kids and this deficiency sign is called “enzootic ataxia” or swayback^{iv}. There is no scientific evidence linking “fish tails” with copper deficiency. Sheep that normally have black wool can lose pigmentation if copper deficient but many owners of black goats confuse sun bleaching with copper deficiency. Plasma blood or ideally liver samples (from biopsies or from goats killed for meat) are the best samples for testing for liver deficiency. Research showed no link between hair copper levels and levels of copper in the diet^v.

There are maps that show areas of Australia that are copper deficient but these are only a guide^{vi}. Heavy use of molybdenum fertilisers can reduce copper uptake as can high iron levels in bore water. So every farm is different. Ideally a controlled study should be done with a percentage of the goat herd left untreated and the rest given COWP boluses. If there is copper deficiency then the treated goats will perform better than the controls. However if a case of enzootic ataxia has been confirmed by post-mortem samples, then all pregnant goats need to be given COWP boluses. Fortunately goats are less likely to get copper toxicity than sheep.



Common mineral deficiencies across Australia. Source: Dickson, H (2016)



Research ^{vii} in the USA and in South Africa^{viii} has shown that COWP boluses can kill between 75% to 96% of Barbers pole worms (*Haemonchus contortus*). This research was repeated in Australia with 32 kg weaned goats were given 3 different doses of COWP after being drenched with barbers pole larvae and this showed reduced worm egg counts 13 days later and improved Packed Cell Volume (red blood cell % in the blood)^{ix}. An additional benefit is that they can improve the efficacy of white drenches if given at the same time making they work closer to 95% in killing worms^x. However it has been shown that the addition of COWP bolus to a moxidectin drench e.g. Cydectin[®], Marathon[®], Moxitak[®], SheepGuard[®] showed no increase in efficacy. It is not sure exactly how the COWP kill barbers pole worms but it is suggested they change the acid levels in the 4th stomach where these worms live. They don't kills scour worms which live lower down in the intestines. Research in goats

showed that COWP had no effect on *Teladorsagia*, *Trichostrongylus* and *Oesophagostomum* worm burdens.^{xi}

Dose rates

Most researchers used 2 grams per adult goat and in adult dairy goats^{xixiii} although one used 2 grams for weaned kids^{xiv}. Research in lambs showed no difference between 1 gram and 2 gram doses for lambs^{xv}. Registered Australian goat COWP boluses generally contain 2.1 grams of copper as copper oxide so to give a half a dose open the capsule and pour half the contents into an empty gelatin capsule. Gelatin capsules are sold in health food shops or online.



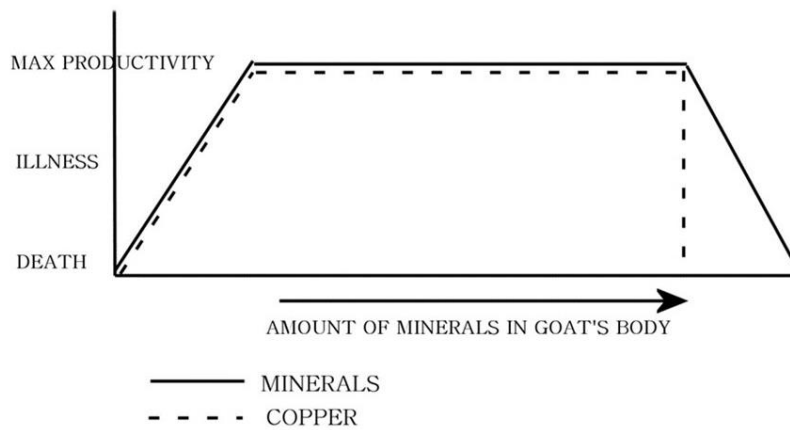
The COWP do not have to be given in the capsule via a balling gun and can be added to their feed^{xvi}. This means the contents of the COWP bolus can be given on a slice of margarine spread bread or in a saucer of molasses or similar sticky treat. It is important that each goat gets the correct dose. Kids and miniature goats need less than adult dairy or meat goats.



South African research has shown the effects of giving COWP boluses last 28 days or less in goats^{xvii}. Like with all worm treatments, only goats suffering from barbers pole infection should be treated to prevent resistance developing. FAMACHA[®] scores or worm egg counts can be used to identify goats needing treatment. Worm egg counts should be checked again at around 21 days.

How often can I give COWP?

The problem with COWP is that they can cause chronic copper toxicity. Copper is an accumulative poison and is stored in the goat's liver building up until it reaches saturation point and all the copper is then released into the blood stream. This results in the destruction of the red blood cells and sudden death with blood tinged urine and gun metal coloured kidneys as the kidneys have been trying to filter out all the damaged red blood cells. Unlike other mineral toxicities, there are no warning signs before the sudden death.



It is therefore essential that other sources of copper are removed before starting to use COWP. Algal blocks should be removed from water troughs and a mineral block or loose minerals with high copper levels should be removed at least 6 weeks before starting. Mineral licks with low copper levels can be left in place. Copper sulphate should never be given to goats.

Research in South African goats found that copper levels had returned to normal 3 months after COWP administration^{xviii}. Also the American Consortium for Small Ruminant Parasite Control (www.wormx.info) recommend a maximum of 4 COWP administrations a year but these can be concentrated in the spring- summer- autumn seasons as long as no closer than approximately 6 weeks apart. They also recommend testing the livers of goats for copper levels once a program of COWP use is established. The livers can be collected from goats killed for meat or which die suddenly e.g. from an accident. Goats that die slowly may have used up their copper reserves. A lobe of the liver can be frozen until sent to a laboratory. A minimum of 50 grams is needed. Unfortunately there is a large cost (approximately \$175) plus transport to an Australian lab.

Do I need a veterinary prescription?

It depends on the legislation in your Australian state or Territory. While COWP boluses are registered for use in goats this is for treating copper deficiency and only once per year. If giving more often and hence not according to the registered label directions and for a different purpose then strict interpretation of most legislation means that a veterinarian's prescription (called a technical advice note in Victoria) is needed. The veterinarians' prescriptions will give details on the maximum use of COWP which will prevent copper toxicity plus listing any with-holding periods they may impose. COWP boluses have a nil meat and milk with-holding period when used for copper deficiency.

References

- Burke, J. M., J. E. Miller and T. H. Terrill (2013). Copper Oxide Wire Particles to Control Haemonchus contortus in Sheep and Goats. American Consortium for Small Ruminant Parasite Control 10th Anniversary Conference, Fort Valley, Georgia, USA, Fort Valley State University.
- Burke, J. M., J. E. Miller, T. H. Terrill, E. Smyth and M. Acharya (2016). "Examination of commercially available copper oxide wire particles in combination with albendazole for control of gastrointestinal nematodes in lambs." Veterinary Parasitology **215**: 1-4.

Cawdell-Smith, A. J., P. Mayuni, M. L. Murphy and M. R. Knox (2008). Copper Oxide Wire Particles as an Anthelmintic for Goats. Aust. Soc. Anim. Prod.: 27: 36.

Chartier, C., E. Etter, H. Hoste, I. Pors, C. Koch and B. Dellac (2000). "Efficacy of copper oxide needles for the control of nematode parasites in dairy goats." Vet Res Commun **24**(6): 389-399.

Orlik, S. T. N. (2010). Copper oxide wire particles in feed pellets for controlling gastrointestinal nematode infection in ewes and lambs. Masters, Louisiana State University.

Schweizer, N. M., D. M. Foster, W. B. Knox, H. J. Sylvester and K. L. Anderson (2016). "Single vs. double dose of copper oxide wire particles (COWP) for treatment of anthelmintic resistant *Haemonchus contortus* in weanling lambs." Veterinary Parasitology **229**: 68-72.

Soli, F., T. H. Terrill, S. A. Shaik, W. R. Getz, J. E. Miller, M. Vanguru and J. M. Burke (2010). "Efficacy of copper oxide wire particles against gastrointestinal nematodes in sheep and goats " Veterinary Parasitology (Netherlands) **168**(1-2): 93-96.

Thonney, M. (2017). Copper oxide wire particles to control *H. contortus* on sheep and goat farms with a range of grazing practices. Final Report, Cornell University

Thonney, M. (2020). Copper oxide wire particles to control *H. contortus* on sheep and goat farms with a range of grazing practices, Cornell University.

Vatta, A. F., P. J. Waller, J. B. Githiori and G. F. Medley (2009). "The potential to control *Haemonchus contortus* in indigenous South African goats with copper oxide wire particles." Vet Parasitol **162**(3-4): 306-313.

Vatta, A. F., P. J. Waller, J. B. Githiori and G. F. Medley (2012). "Persistence of the efficacy of copper oxide wire particles against *Haemonchus contortus* in grazing South African goats." Vet Parasitol **190**(1-2): 159-166.

ⁱ {Harvey, JM (1952) Australian Veterinary Journal Vol. 28 Issue 8 Pages 209-216

ⁱⁱ {Harvey, 1952 #2161}

ⁱⁱⁱ Seaman, T J & Hartley, W J (1981) Australian Veterinary Journal Vol. 57 Issue 7 Pages 355-356

^{iv} Ozkul, JA et al (2012) Journal of veterinary science 2012 Vol. 13 Issue 1 Pages 107-109

^v Solaiman, SG et al (2001) Small Ruminant Research 2001 Vol. 41 Issue 2 Pages 127-139

^{vi} Dickson, H (2016) MLA report

^{vii} Burke, J. M., J. E. Miller and T. H. Terrill (2013). Copper Oxide Wire Particles to Control *Haemonchus contortus* in Sheep and Goats. American Consortium for Small Ruminant Parasite Control 10th Anniversary Conference, Fort Valley, Georgia, USA, Fort Valley State University.

^{viii} Vatta, A. F., P. J. Waller, J. B. Githiori and G. F. Medley (2009). "The potential to control *Haemonchus contortus* in indigenous South African goats with copper oxide wire particles." Vet Parasitol **162**(3-4): 306-313.

^{ix} Cawdell-Smith, A. J., P. Mayuni, M. L. Murphy and M. R. Knox (2008). Copper Oxide Wire Particles as an Anthelmintic for Goats. Aust. Soc. Anim. Prod.: 27: 36.

^x Burke, J. M., J. E. Miller, T. H. Terrill, E. Smyth and M. Acharya (2016). "Examination of commercially available copper oxide wire particles in combination with albendazole for control of gastrointestinal nematodes in lambs." Veterinary Parasitology **215**: 1-4.

^{xi} Chartier, C., E. Etter, H. Hoste, I. Pors, C. Koch and B. Dellac (2000). "Efficacy of copper oxide needles for the control of nematode parasites in dairy goats." Vet Res Commun **24**(6): 389-399.

^{xii} Thonney, M. (2017). Copper oxide wire particles to control *H. contortus* on sheep and goat farms with a range of grazing practices. Final Report, Cornell University

^{xiii} Thonney, M. (2020). Copper oxide wire particles to control *H. contortus* on sheep and goat farms with a range of grazing practices, Cornell University.

^{xiv} Soli, F., T. H. Terrill, S. A. Shaik, W. R. Getz, J. E. Miller, M. Vanguru and J. M. Burke (2010). "Efficacy of copper oxide wire particles against gastrointestinal nematodes in sheep and goats " Veterinary Parasitology (Netherlands) **168**(1-2): 93-96.

^{xv} Schweizer, N. M., D. M. Foster, W. B. Knox, H. J. Sylvester and K. L. Anderson (2016). "Single vs. double dose of copper oxide wire particles (COWP) for treatment of anthelmintic resistant *Haemonchus contortus* in weanling lambs." Veterinary Parasitology **229**: 68-72.

^{xvi} Orlik, S. T. N. (2010). Copper oxide wire particles in feed pellets for controlling gastrointestinal nematode infection in ewes and lambs. Masters, Louisiana State University.

^{xvii} {Vatta, 2012 #6354}

^{xviii} Vatta, A. F., P. J. Waller, J. B. Githiori and G. F. Medley (2012). "Persistence of the efficacy of copper oxide wire particles against *Haemonchus contortus* in grazing South African goats." Vet Parasitol **190**(1-2): 159-166.