GET YOUR SHEEP
PERFORMANCE READY
WITH MULTIMIN

IMPROVING FERTILITY & IMMUNITY IN SHEEP

Virbac

Shaping the future of animal health

INCREASING YOUR PROFITABLITY BY OPTIMISING FERTILITY AND FECUNDITY

Reproductive performance is a key determinant of profitability in self-replacing lamb and wool enterprises. Merino ewes are typically mated to coincide with their peak natural cycling activity between March and May to lamb one month before peak pasture production, while first-cross or meat breed ewes are mated one or two months earlier.

Meat & Livestock Australia recommends that 90% of Merino ewes and 95% of crossbred ewes should conceive in the first two cycles (35 days) of the joining program to ensure a tight lambing period.[1] This means ewes only have two opportunities to conceive each year.

The objective is to optimise fertility (i.e. the ability to conceive) and fecundity (i.e. the number of embryos per ewe). Increasing pregnancy and overall conception rates can have a significant and lasting beneficial impact on the productivity of your flock. Besides optimising the number of lambs born, lambs will be born earlier and reach market specifications and/or critical joining weights sooner. Likewise, ewes will have more time to regain body condition before the next lambing.

Conversely, lambs born later in the season have lower survival rates due to lower bodyweight over summer and compromise their dams' ability to regain sufficient body condition. A longer joining period can also delay important animal husbandry practices, such as marking and weaning, which can have flow-on impact on growth rates, worm control and pasture management.

Reproductive efficiency is determined by:

- ***Good nutrition to ensure:***
  - ***maiden ewes attain critical mating weights***
  - ***ewes are in optimal condition at lambing to maximise lamb survival***
  - ***ewes regain body condition after lambing***
- ***Implementing a thorough animal health program***
- ***Trace mineral 'top up'***
- ***Achieving optimal conception rates***
- ***Reducing embryo loss***

ESSENTIAL TRACE MINERALS TO INCREASE ANTIOXIDANT LEVELS

Multimin Copper-Free Injection for Sheep contains manganese, selenium and zinc only.

Multimin Plus Copper Injection for Sheep contains copper, manganese, selenium and zinc.

MULTIMIN GETS YOUR SHEEP PERFORMANCE READY

One of the easiest ways to improve reproductive performance in your flock is to ensure maiden ewes have adequate access to essential trace minerals, such as copper, manganese, selenium and zinc. These minerals play a key role in optimising fertility, growth rates and general health.

Sub-optimal copper levels can increase infertility, abortion and susceptibility to microbial infections, a leading cause of death in sheep.[2,3] Sub-optimal manganese levels can restrict testicular growth in ram lambs; and delay or depress oestrus and reduce conception rates in ewes.[4,5] Sub-optimal selenium levels can cause infertility, high embryo mortality and reduced lamb survival.[6-8] Sub-optimal zinc levels can reduce sperm production, lambing rates, birth weights and lamb survival.[9-15]

Often, milk or pastures do not provide sufficient levels of these essential minerals during periods of 'high demand', such as at joining, lambing or weaning. Despite this, mineral supplementation is often only provided if clinical signs of deficiency have been observed. Even then, the lower absorption rates of oral supplements can take months to increase trace mineral status.

Multimin trace mineral injections make your flock 'performance ready' by optimising fertility and immunity. Applied at weaning or four weeks before joining or lambing, these unique formulations 'top up' levels of essential minerals during 'high demand' periods. Multimin is scientifically-proven to improve fertility, fecundity, and immunity.[17-19,25]

The unique trace mineral injection:

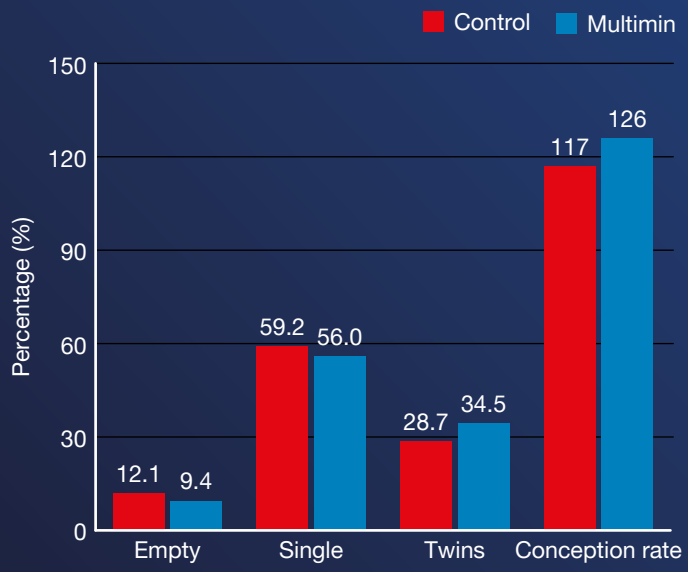
- ***'Tops up' blood levels of essential minerals during 'high demand' periods***
- ***Two formulations (copper-free and copper)***
- ***Absorbed into the blood within 8 hours and the liver within 24 hours[16]***
- ***Prolonged antioxidant action for months[17]***
- ***Balanced, chelated formulation[18]***
- ***Nil milk and meat WHP and ESI***

Normal bodily processes, such as energy metabolism, ovulation, pregnancy or fighting disease, produce 'free radicals'. These unbalanced molecules cause chemical reactions that may damage cells. Antioxidants are substances that neutralise free radicals. Multimin 'tops up' levels of essential minerals required for the synthesis of the two antioxidants that protect the body's reproductive and immune systems, as well as providing a direct source of nutrients for these systems. Multimin is absorbed into the bloodstream within eight hours and the liver by 24 hours, and provides prolonged antioxidant action for several months.[16,17]

Trace minerals in Multimin are needed for the synthesis of antioxidants that neutralise harmful free radicals into harmless water.

OPTIMISES PREGNANCY AND CONCEPTION RATES

A large-scale Australian trial has confirmed Multimin significantly improves conception rates (i.e. no of foetuses per 100 ewes) by increasing pregnancy rates, the incidence of multiple births and embryo retention.[19] A total of 3829 ewes on four commercial properties in Victoria, South Australia and Western Australia were randomly allocated to treatment or untreated control groups. Treated ewes were given a single administration of Multimin Copper-Free Injection for Sheep 30 days before joining. Blood testing confirmed that mineral levels in both groups of sheep were within normal ranges. The pregnancy status (i.e. pregnant or empty) and conception rates (i.e. the number of foetuses per 100 ewes) of all ewes were determined by ultrasound 85 days after joining. In this study, ewes treated with Multimin had 2.7% and 9% higher pregnancy and conception rates, respectively, than untreated ewes. The number of treated ewes with twins increased by 5.8%.



MULTIMIN FOR OPTIMAL

OPTIMISES EMBRYO SURVIVAL

It is estimated between 20 and 30% of all conceptions in ewes are lost in the first three to four weeks after conception.[20] Ewes experiencing embryo death within 11 days of conception will return to oestrus with a normal cycle length. While these ewes may conceive again later in the season, they will lamb later and lengthen the lambing pattern of your flock. Ewes experiencing embryo death after this time will have significantly longer cycle lengths and may fail to conceive within the breeding period. Embryo loss is caused by range of factors, but all relate to the health of the embryo itself and/or the stress placed on it by free radicals. The damaging role of 'free radicals' on the fertility of many species, including humans, has been documented.[21] Multimin optimises embryo survival by providing a rapidly-absorbed source of essential minerals required by the antioxidant systems to fight 'free radicals'.

IMPROVES SPERM QUALITY

Multimin makes rams 'performance ready' by optimising sperm quality. Studies have found that the provision of trace minerals, such as selenium and zinc, can have a positive effect on sperm concentration, motility and morphology in rams.[22,23] Rams should be vaccinated and drenched routinely, and examined by a veterinarian before the joining season.

FERTILITY, IMMUNITY AND PRODUCTIVITY

IMPROVES IMMUNE FUNCTION

Pre-lambing ewes have elevated trace mineral requirements. Not only do they require nutrients for maintaining their own body functions, they must also provide nutrients for their rapidly-developing foetus(es). This is compounded by reduced feed intake, particularly in ewes carrying twins.

Any compromise to the immune system caused by poor nutrition, environmental conditions or physiological stresses increases the animal's risk of disease. While clinical disease can cause obvious signs of sickness or death, even sub-clinical (non-visible) disease can cause significant production losses via reduced fertility, milk production or weight gain.

'Topping up' levels of essential minerals before lambing helps to maintain the health of ewes and lambs. In ewes, it can help to reduce the incidence of foot abscesses, lameness, mastitis, retained membranes and metritis, all of which can have a negative impact on subsequent conception rates.[24,25] Ensuring the lamb is born with optimum levels of trace minerals helps to increase survival rates and development.

One of the easiest ways to boost the immune system is to ensure pre-lambing ewes receive a rapidly-absorbed 'top up' of essential trace minerals. Multimin makes your sheep 'performance ready' by boosting all three parts of the immune system (physical barriers, non-specific immune response and specific immune response).

Studies have shown the administration of Multimin at the same time as vaccination can significantly improve immune response, thereby boosting the level of protection provided by the vaccine.[18]

FORMULATIONS

	Multimin Plus Copper Injection for Sheep	Multimin Copper-Free Injection for Sheep
Copper	10 mg/mL copper as disodium copper EDTA	N/A
Manganese	10 mg/mL manganese as disodium manganese EDTA	10 mg/mL manganese as disodium manganese EDTA
Selenium	3 mg/mL selenium as sodium selenite	5 mg/mL selenium as sodium selenite
Zinc	40 mg/mL zinc as disodium zinc EDTA	40 mg/mL zinc as disodium zinc EDTA

DOSAGE

Multimin Plus Copper Injection for Sheep and Multimin Copper-Free Injection for Sheep are administered as a subcutaneous injection at 0.2 mL / 10 kg (1 mL / 50 kg). Always dose sheep according to their individual bodyweight. Do not administer more than the recommended amount.

Liveweight (kg)	Dose (mL)	Doses per pack	
		(200 mL)	(500 mL)*
20-25	0.5	400	1000
26-30	0.6	333	833
31-35	0.7	285	714
36-40	0.8	250	625
41-45	0.9	222	555
46-50	1.0	200	500
51-55	1.1	181	454
56-60	1.2	166	416
61-65	1.3	153	384
66-70	1.4	142	357
≥70	0.2 mL / 10 kg		

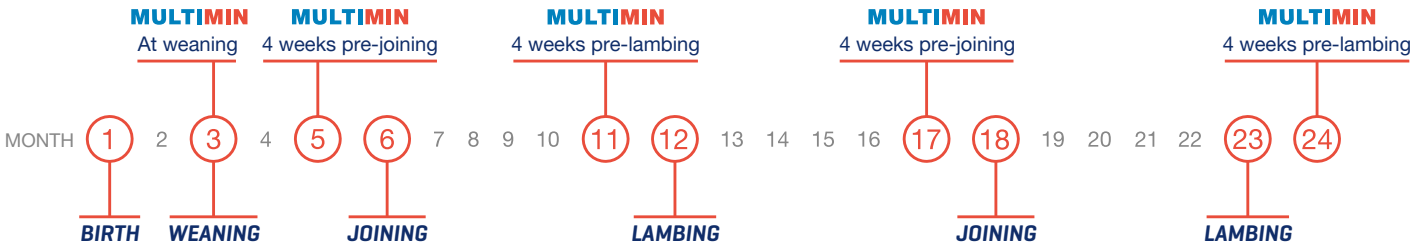
**Multimin Copper-Free Injection for Sheep is available in 500 mL pack size only.*

ADMINSTRATION TECHNIQUE

Sterilise the injector and needles by boiling (or equivalent) before use. Avoid the use of strong disinfectants. Use the shortest needle possible (6 mm 18 gauge). Keep needles sharp and clean. Replace needles frequently. Maintain cleanliness at all times. Avoid injection of animals during wet or dusty conditions. Inject under the skin, ideally high on the neck behind the ear to avoid carcase damage. Some animals may show discomfort after injection. Slight swelling may be observed at the injection site for a few days after administration. Dispose of empty container and packaging by wrapping with paper and putting in garbage. Discarded needles/sharps should immediately be placed in a designated and labelled 'sharps' container.

WHEN TO ADMINISTER MULTIMIN

Multimin Injection should be administered before 'high demand' periods, such as at weaning or four weeks before joining or lambing, to allow antioxidant levels to peak. Administer to ewes four weeks before joining and lambing and to rams 12 weeks before joining. Multimin should be administered every year, regardless of seasonal conditions, and as part of an integrated nutrition and animal health program.



CONCURRENT TREATMENT

Multimin can be administered in combination with other animal health products, including vaccines (e.g. Websters 6 in 1) and parasite control products (e.g. Tridectin®, Cydectin® Long Acting Injection, Eweguard® or Weanerguard®). DO NOT administer Multimin at the same injection site as other injectable animal health treatments. DO NOT administer Multimin in combination with Eweguard® with Se B12, Weanerguard with Se B12 or other vaccines containing selenium.

MANAGEMENT CONSIDERATIONS

Sheep are sensitive to excessive copper. When deciding which Multimin product is suitable for your enterprise, please consider the copper requirements of your flock, as well as the amount of copper available from all other sources. Consult your veterinarian to determine if Multimin Plus Copper is suitable for your flock. Alternatively, Multimin Copper-Free is suitable for use if your copper status is unknown.

WITHHOLDING PERIODS

Milk Withholding Period:	NIL
Meat Withholding Period:	NIL
Export Slaughter Interval:	NIL

GET YOUR SHEEP
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- ***Multimin is a unique trace mineral injection that makes your sheep 'performance ready' by improving fertility and immunity.[18]***
- ***Multimin enhances antioxidant systems to improve the health and performance of livestock.[17]***
- ***Multimin optimises the number of lambs born by increasing fecundity and reducing embryo loss.[19]***
- ***Multimin is rapidly-absorbed, readily-utilised and provides prolonged antioxidant activity during 'high demand' periods.[16,17]***
- ***Multimin is scientifically-proven to improve health and performance of livestock.***

For more information about how Multimin can improve the health and performance of your flock, contact Virbac Customer Support 1800 242 100.

au.virbac.com

References: 1. *Making more from sheep. Module 10: Wean more lambs.* Meat & Livestock Australia, 2008. 2. Howell, J.M. and Hall, G.A. (1970) Infertility associated with experimental copper deficiency in sheep, guinea-pigs and rats. In: Mills, C.F. (ed.) *Trace Element Metabolism in Animals*. E. & S. Livingstone, Edinburgh, pp. 106–109. 3. Suttle, N.F. *et al*. (1987) Copper supplementation during pregnancy can reduce perinatal mortality and improve early growth in lambs. *Proceedings of the Nutrition Society* 46:68A. 4. Masters, D.G. *et al*. (1988). Influence of manganese intake on body, wool and testicular growth of young rams and on the concentration of manganese and the activity of manganese enzymes in tissues. *Aust. J. Agri. Res*. 39:517–524. 5. Underwood, E.J. and Suttle, F. (1999) *The Mineral Nutrition of Livestock*, 3rd ed. CAB International, Wallingford, UK. 6. Wilkins, J.F. and Kilgour, R.J. (1982). Production responses to selenium in northern New South Wales. 1. Infertility in ewes and associated production. *Aust. J. Exp. Agri. Anim. Husb*. 22:18–23. 7. Hartley, W.J. (1963). Selenium and ewe fertility. *Proceedings of the New Zealand Society of Animal Production* 23:20–27. 8. Kott, R.W. et al. (1983). Effects of vitamin E and selenium injections on reproduction and pre-weaning lamb survival in ewes consuming diets marginally deficient in selenium. *J. Anim. Sci*. 57:553–558. 9. Ott, E.A. *et al*. (1964). Zinc deficiency syndrome in young lamb. *J. Nutr*. 82:41–50. 10. Underwood. E.J. and Somers, M. (1969). Studies of zinc nutrition in sheep. 1. The relation of zinc to growth, testicular development and spermatogenesis in young rams. *Aust. J. Agri. Res*. 20:889–897. 11. Martin, G.B. and White, C.L. (1992). Effects of dietary zinc deficiency on gonadotrophin secretion and testicular growth in young male sheep. *J. Reprod. Fert*. 96:497–507. 12. Egan, A.R. (1972). Reproductive responses to supplemental zinc and manganese in grazing Dorset Horn ewes. *Aust. J. Exp. Agri. Anim. Husb*. 12:131–135. 13. Masters, D.G. and Fels, H.E. (1980) Effect of zinc supplementation on the reproductive performance of grazing Merino ewes. *Biological Trace Element Research* 2:281–290. 14. Mahmoud, O.M. et al. (1983). Zinc deficiency in Sudanese desert sheep. *J. Comp. Pathol*. 93:591–595. 15. Apgar, J. *et al*. (1993). Dietary zinc deprivation effects parturition and outcome of pregnancy in the ewe. *Nutr. Res*. 13:319–330. 16. Hansen (2007), Iowa State University, Department of Animal Science.* 17. Machado, V., *et al*. (2014). The effect of injectable trace minerals (selenium, copper, zinc, and manganese) on peripheral blood leucocyte activity and serum superoxide dismutase activity of lactating Holstein cows. *Vet J*. 200:299-304.* 18. Arthington. J. & Havenga, L. (2012). Effect of injectable trace minerals on the humoral immune response to multivalent vaccine administration in beef calves. *J. Anim. Sci*. 90:1966-1971. 19. Swaney, S. (2014). Increasing conception rates in sheep by using an injectable trace mineral product prior to joining in diverse regions across Australia. Virbac data on file. 20. Edey, T.N. (1969). Pre-natal mortality of sheep: a review. Animal Breeding Abstracts 37:173-190. 21. Agarwal, A. & Gupta, S. (2006), The role of free radicals and antioxidants in female infertility and assisted reproduction. *US Genito-Urinary Disease*, pp60–65. 22. Ghorbani, A. et al. (2018). Influences of dietary selenium, zinc and their combination on semen characteristics and testosterone concentration in mature rams during breeding season, *J. Appl. Anim. Res*., 46(1):813-819. 23. Piagentini, M. (2017). Effect of selenium supplementation on semen characteristics of Brazil's ram. *Reprod. Domest. Anim*. 52(3). 24. Giadinis, N.D. *et al*. (2011). Selenium, vitamin E and vitamin A blood concentrations in dairy sheep flocks with increased or low clinical mastitis incidence. *Small Ruminant Res*. 95:193-196. 25. Machado, V. *et al*. (2013). Effect of an injectable trace mineral supplement containing selenium, copper, zinc and manganese on the health and production of lactating Holstein cows. *Vet J*. 197(2):451-6.
**The Multimin formulation in this study contained different levels of minerals compared to the registered formulation described in this document. Benefits described by these studies are not registered label claims.*

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