MULTIMIN®

WHEN IT MATTERS

Shaping the future of animal health

Virbac

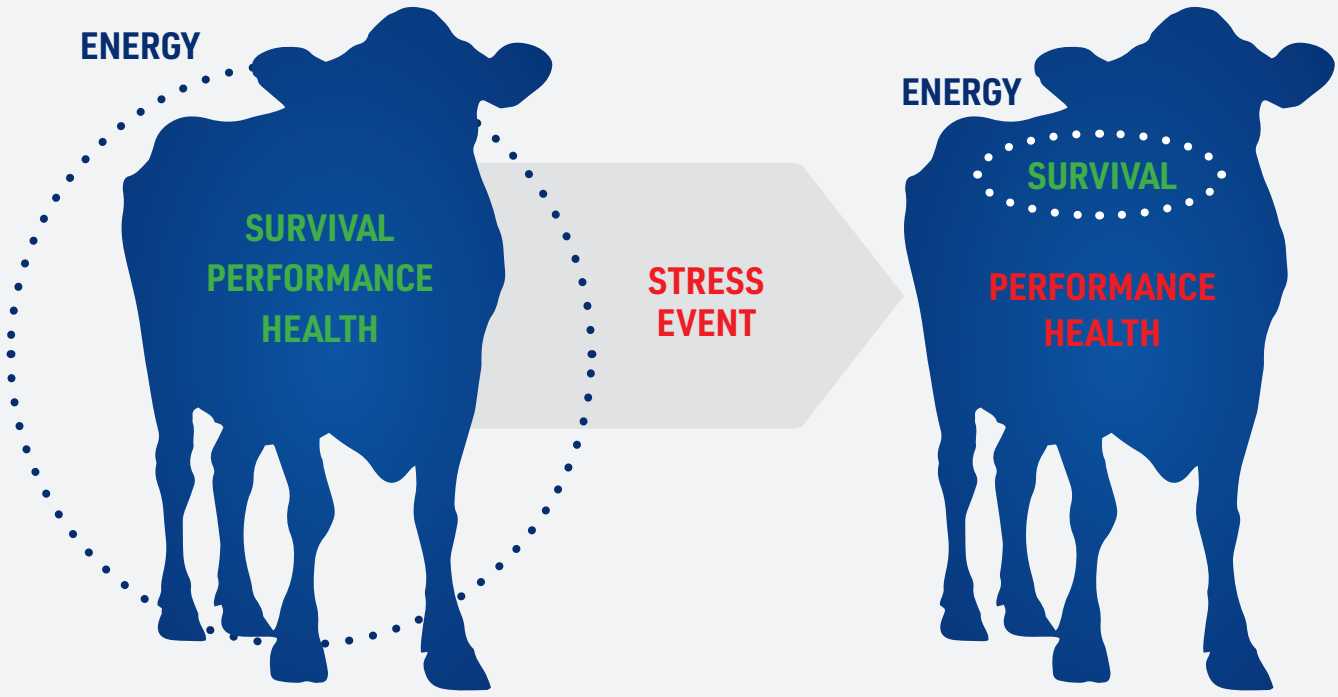
WHAT DOES STRESS MEAN TO AN ANIMAL?

BEEF AND DAIRY CATTLE ARE INEVITABLY EXPOSED TO STRESS DURING THEIR PRODUCTIVE LIVES

Pregnancy, lactation, weaning, handling, transportation, commingling, heat or cold stress, and feedlot induction may lead to psychological, physiological and physical stress, which results in loss of trace minerals from the body, and reduced feed intake.[1]

WHAT HAPPENS WHEN A STRESSFUL EVENT OCCURS?

Cortisol, the primary stress hormone, is released and can alter glucose, protein & lipid metabolism, which can reduce growth, reproduction and immune function.[2,3]



NEGATIVE IMPACT ON PERFORMANCE AND HEALTH

Cortisol has been associated with **reduced reproduction rates, a drop in milk production, and suppression of the immune system, which causes greater disease susceptibility.**

REDUCED NUTRIENT UTILISATION AND ENERGY

High cortisol levels alter how animals utilise nutrients and energy, re-allocating them away from important metabolic processes such as growth and immunity. Stress also **leads to a decrease in feed intake,** which further exacerbates the problem.

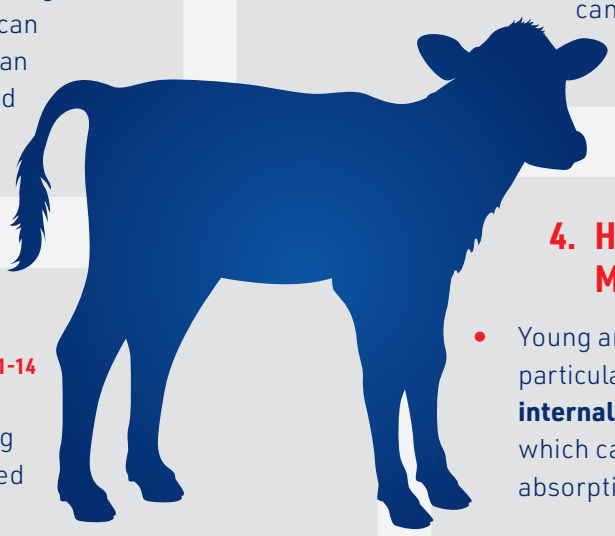
THE TIMES WHEN **PRESSURES** ON GROWING CATTLE ARE AT THEIR HIGHEST

1. WEANING STRESS[1,4,5]

- **Weaning** is the most stressful period in a young animal's life. Nutritional, social, physical, and psychological stressors are imposed on the calf, resulting in behavioural and physiological changes
- **Transitioning Diets:** The weaning process, where calves transition from milk to solid food, can be stressful and impact growth if not managed properly
- **Social Stress:** Separation from the mother and adjusting to new social groups can cause stress, which can negatively affect feed intake and growth

2. ENVIRONMENTAL AND HANDLING STRESS[6-10]

- **Weather Conditions:** Extreme weather conditions, such as heat stress and cold stress, can affect cattle growth and health
- **New paddocks** where calves are kept after weaning can be unknown environments. Cattle are unfamiliar with the location of resources such as food, shade, or water, leading to confusion and stress
- **Cattle transport** can often lead to a weakened immune system and sickness
- **Handling Stress:** Correct handling of cattle is a crucial component of good animal welfare. Poorly designed or maintained facilities and poor handling can lead to pain, confusion, frustration, and stress



3. NUTRITIONAL REQUIREMENTS[11-14]

- **Balanced Diet:** Young cattle need a balanced diet rich in essential nutrients, energy, protein, vitamins, and trace minerals, to support rapid growth and development
- **Eating Behaviour and Feed Intake:** At weaning, feed intake is often reduced due to several factors, including stress, more time spent walking/seeking, exposure to novel feeds and environment, and changes in the herd's social structure. Inadequate intake of key nutrients can lead to marginal deficiencies, which can affect growth rates, fertility, immune function, and overall health

4. HEALTH AND DISEASE MANAGEMENT[15-17]

- Young and stressed cattle are particularly susceptible to **internal and external parasites**, which can affect nutrient absorption and overall health
- Stressed cattle also face an increased threat of infectious disease such as bovine respiratory disease, which can cause significant morbidity and mortality
- Calves must be able to **respond to vaccines** and disease challenges. Immunocompetence is driven by good trace mineral nutrition

5 ESSENTIAL TRACE MINERALS
WORKING IN COMBINATION

The 5 essential trace minerals in Multimin Chrome Injection for Cattle[18] are necessary for cattle operations seeking improved performance in growing animals by mitigating stress and improving nutrient utilisation, helping your cattle reach peak performance when it matters most.

DID YOU KNOW YOU'RE ALREADY SUPPLEMENTING WITH CHROMIUM?

It's very likely that you've consumed chromium today without even realising it! Chromium is naturally present in a variety of foods, including nuts, vegetables, grapes, oranges, steak, and many others. Chromium is essential for health and is not only safe but also widely used in both human and livestock nutrition. In fact, chromium is a common ingredient in livestock feed supplements, mineral licks, and human dietary supplements.

1. IMPROVED NUTRIENT UTILISATION

Chromium is an essential trace mineral for cattle.[11-13] Chromium enhances insulin sensitivity, allowing glucose to be better utilised by cells, improving lipid metabolism, promoting protein synthesis and supporting immune function. These effects contribute to improving the overall health and productivity of cattle.[19-26]

- **Protein Synthesis:** By improving insulin function, chromium aids in the uptake of amino acids into muscle cells, promoting protein synthesis and muscle growth, which is essential for the overall development and performance of cattle
- **Enhanced Glucose Uptake:** Chromium enhances insulin sensitivity, improving glucose uptake into muscle cells as glycogen. This is crucial for energy production during physical activity and recovery, supporting muscle development and meat quality
- **Immune Response:** Chromium improves insulin function, allowing more glucose (the most important energy source) to be utilised by the immune cells, improving their ability to respond to infections and inflammation
- **Regulation of Fat Storage:** By improving insulin function, chromium regulates the storage of glucose and fats, reducing fat mobilisation and the risk of metabolic diseases and improving carcass quality

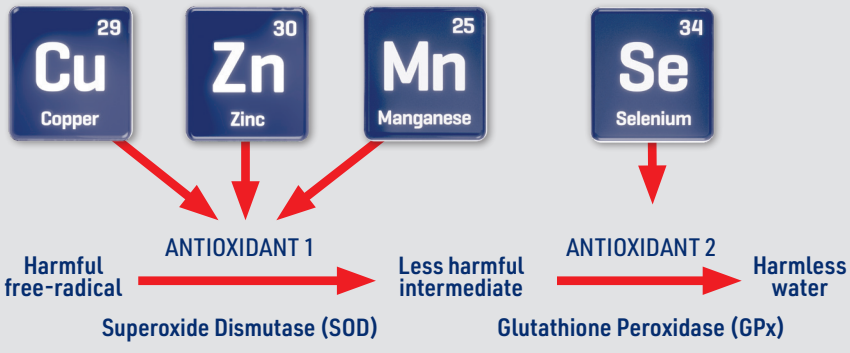
2. REDUCED CORTISOL LEVELS

Chromium has been shown to reduce cortisol levels, the primary stress hormone in animals.[19,21,23,24] By lowering cortisol, chromium can help maintain a stronger immune system.

3. SUPPORT OF THE ANTIOXIDANT SYSTEM

Normal bodily processes, such as metabolism, ovulation, pregnancy, and fighting disease, produce free radicals. These unbalanced molecules cause chemical reactions that may damage healthy cells.

Antioxidants are substances that neutralise these free-radicals. Multimin provides a rapid 'top-up' of the four trace minerals Cu, Zn, Mn and Se, used to synthesise antioxidant **enzymes.[27] In addition, Cr has antioxidant functions, protecting cells from free radical damage.[20,28]** These trace minerals also provide a direct source of trace minerals used by several metabolic processes and the reproductive and immune systems.[13,27]



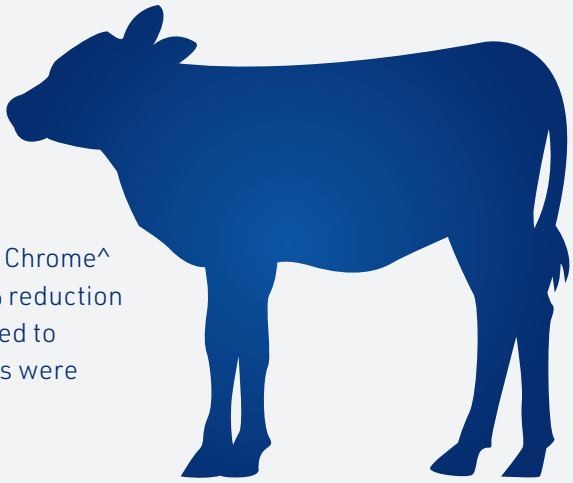
Trace minerals in Multimin are needed for the synthesis of antioxidants that neutralise harmful free-radicals into harmless water.

Increases antioxidant capacity and protects cells from oxidative damage, leading to better health and performance, particularly under stress.

OPTIMISED **CALF HEALTH** WITH MULTIMIN CHROME

University studies in Australia[29] have shown that calves treated with Multimin Chrome had improved antioxidant status at 15 and 35 days post-treatment and tended to have a lower incidence of diseases and mortality within the first 50 days of life than untreated calves.

A 2018 New Zealand study[30] showed calves treated with Multimin Chrome^ experienced a significant reduction in health issues, with a 54% reduction in cases of diarrhoea and a 48% decrease in omphalitis compared to untreated calves. Morbidity and mortality rates in treated calves were reduced by half during the first 140 days of life.



UP TO 60%
REDUCTION IN DISEASE INCIDENCE[29,30]

58%
REDUCTION IN MORTALITY[30]

THE EFFECT OF **MULTIMIN CHROME** ON CALF HEALTH CAN RESULT IN A RETURN ON INVESTMENT OF...

ROI=17:1*

*Calculation based on 1,000 dairy calves and 52% and 58% reduction in morbidity and mortality respectively (Bates et al 2019).

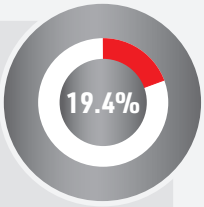
Assuming a 4.5% scour rate and a 3% mortality rate across the herd, cost of losing a heifer = $1,000, sexed semen herd, and 1 mL dose for a 50 kg calf (RRP of $475.20 per 500 mL or $0.95 per dose) of Multimin Chrome. This is a guide only. Outcomes may vary depending on farm management, animal responses and market value.

^The Multimin® formulation used in this study may differ from the formulations registered in Australia.

OPTIMISED **FERTILITY** WITH MULTIMIN

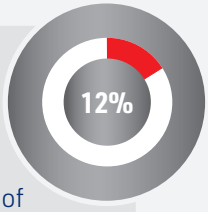
Multimin can improve first-cycle conception rates[31-33] and pregnancy rates.[31,32,34-38] Heifers and cows cycle approximately every 21 days, this means they have just two opportunities to conceive during a six-week joining program. Improving the number of heifers and cows that conceive in the first or second cycle can dramatically tighten the calving pattern.Multimin can improve embryo survival by providing essential trace minerals required by the antioxidant system to fight free-radicals.[27]

IMPROVED FIRST CYCLE CONCEPTION RATES



Multimin has been shown to improve first-cycle conception rates by up to 19.4%.[31-33]

IMPROVED PREGNANCY RATES

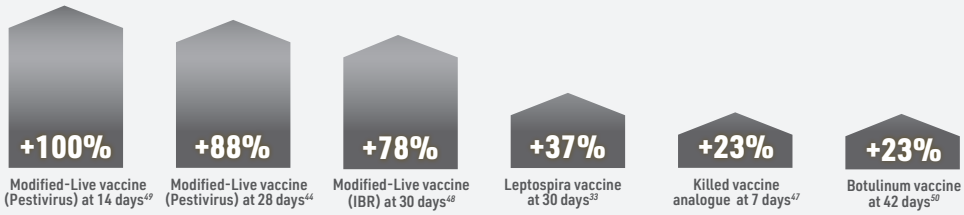


Pregnancy rates in breeding females treated with Multimin are up to 12% higher than untreated females, depending on the length of the breeding season and breeding method.[31,32,34-38]

OPTIMISED **IMMUNITY** WITH MULTIMIN

Optimum trace mineral status enhances the physical barriers against infection and improves innate immunity and antibody production. Multimin has been proven to optimise immune function in cattle, improve vaccine response, reduce the incidence of diseases, and promote disease resilience in cattle.[32,39-53]

EFFECT OF MULTIMIN UPON VACCINE RESPONSE



REDUCED SEVERITY OF DISEASE IN CATTLE

Along with good biosecurity, animal handling, nutrition and routine vaccination, one of the easiest ways to boost the immune system in calves, replacement heifers, and cows is to provide a rapidly absorbed source of essential trace minerals.

MULTIPLE STUDIES SHOWING MULTIMIN'S IMPACT ON REDUCING DISEASE SEVERITY[39-43]

23% REDUCTION in subclinical mastitis in all age groups

16% REDUCTION in endometritis

Up to **50% REDUCTION** in clinical mastitis in mature cows

16% REDUCTION in calf scours

15% REDUCTION in calf pneumonia and otitis

35% REDUCTION in omphalitis

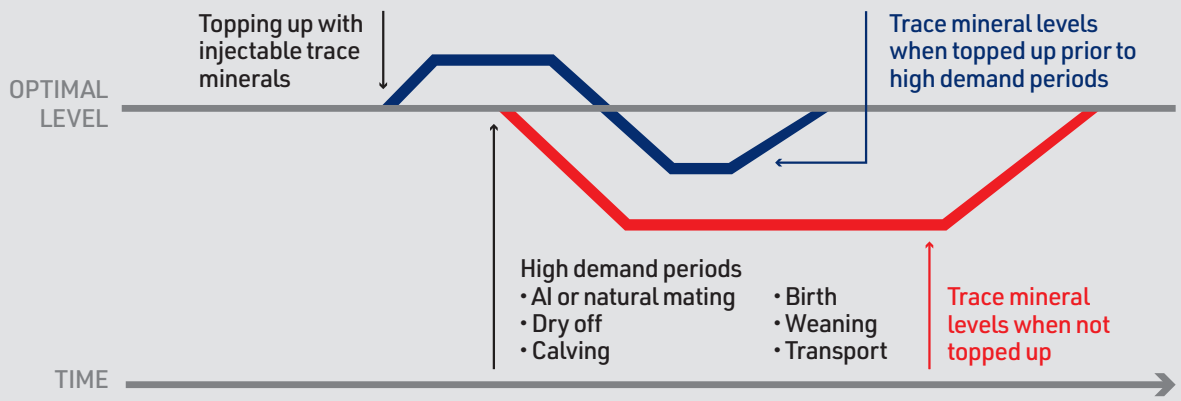
REDUCED COST of veterinary treatments and promotes responsible use of antibiotics

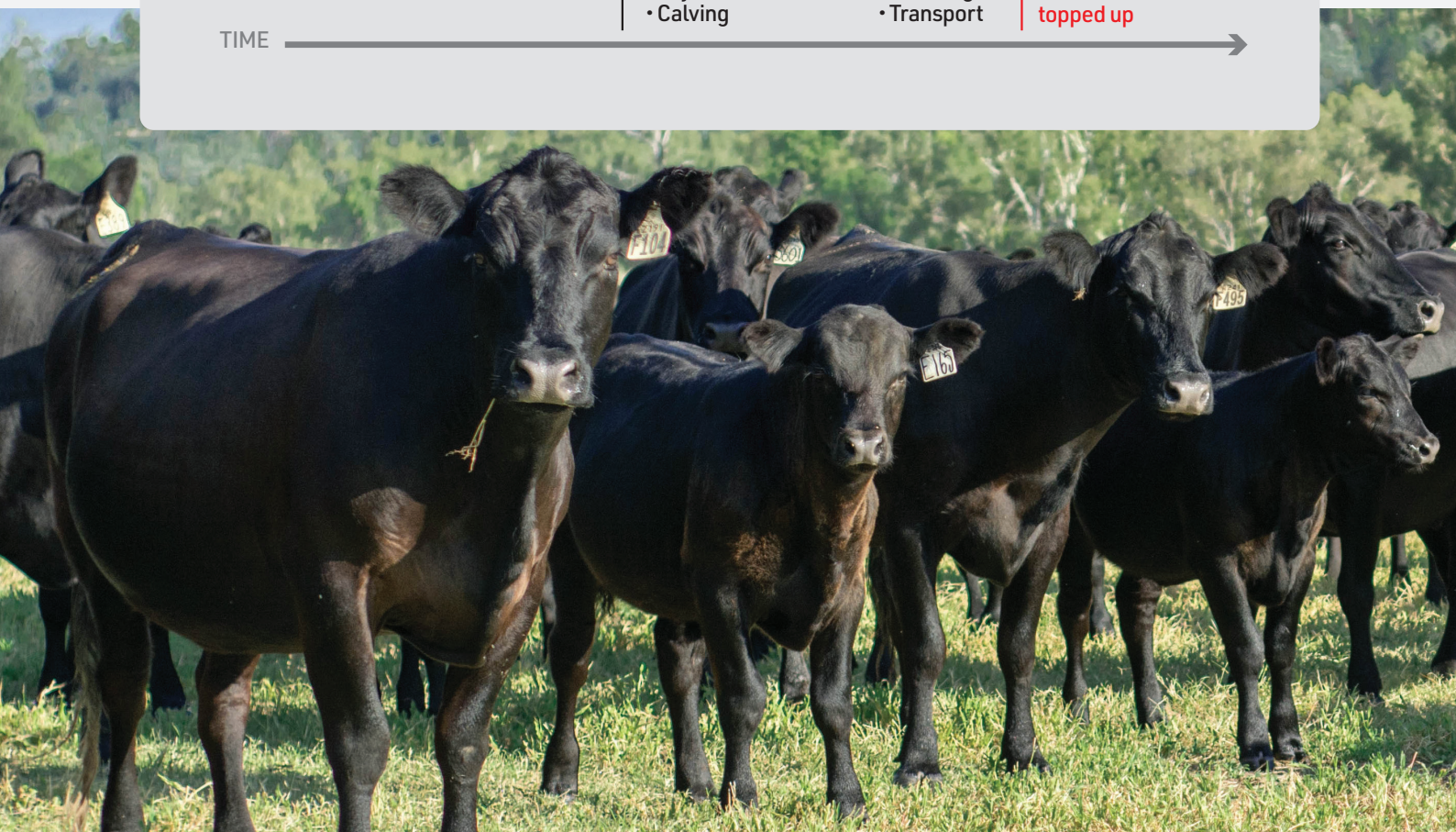
MULTIMIN
AND ORAL SUPPLEMENTS

Demands for Cu, Se, Zn, Mn and Cr increase during high-demand periods in cattle, such as weaning, joining, calving, transport, heat and cold stress, and induction to feedlots.[11-13,54,55] However, pastures and supplementary feed often do not provide sufficient levels of trace minerals to support these high-demand periods, while oral supplements can take months to increase levels of trace minerals in storage sites such as the liver.[56-58]

Many of the orally consumed trace minerals in water solutions, loose mixes and blocks have very low absorption, often, as much as 70-99% of oral trace minerals are excreted from the body due to mineral antagonist interactions with other minerals that occur in the rumen.[13] Studies have shown that Cr concentrations in most ruminant feedstuffs and feed ingredients are low, with variable bioavailability.[59] Consequently, sub-optimal levels of trace minerals Cu, Se, Zn, Mn and Cr at critical stages in the livestock production and reproduction cycle are observed.[13]

STRATEGIC TRACE MINERAL TOP-UP PRIOR TO HIGH DEMAND PERIODS



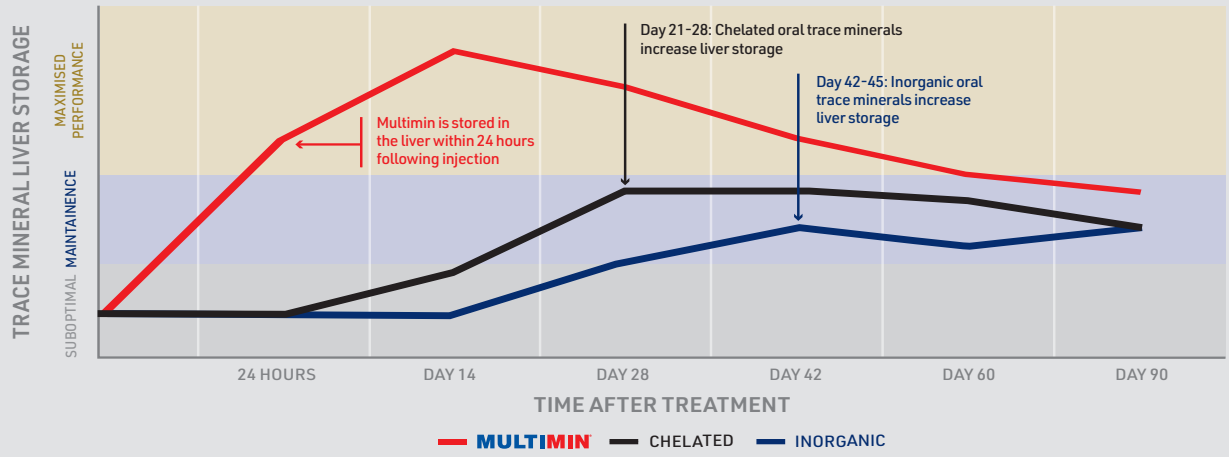


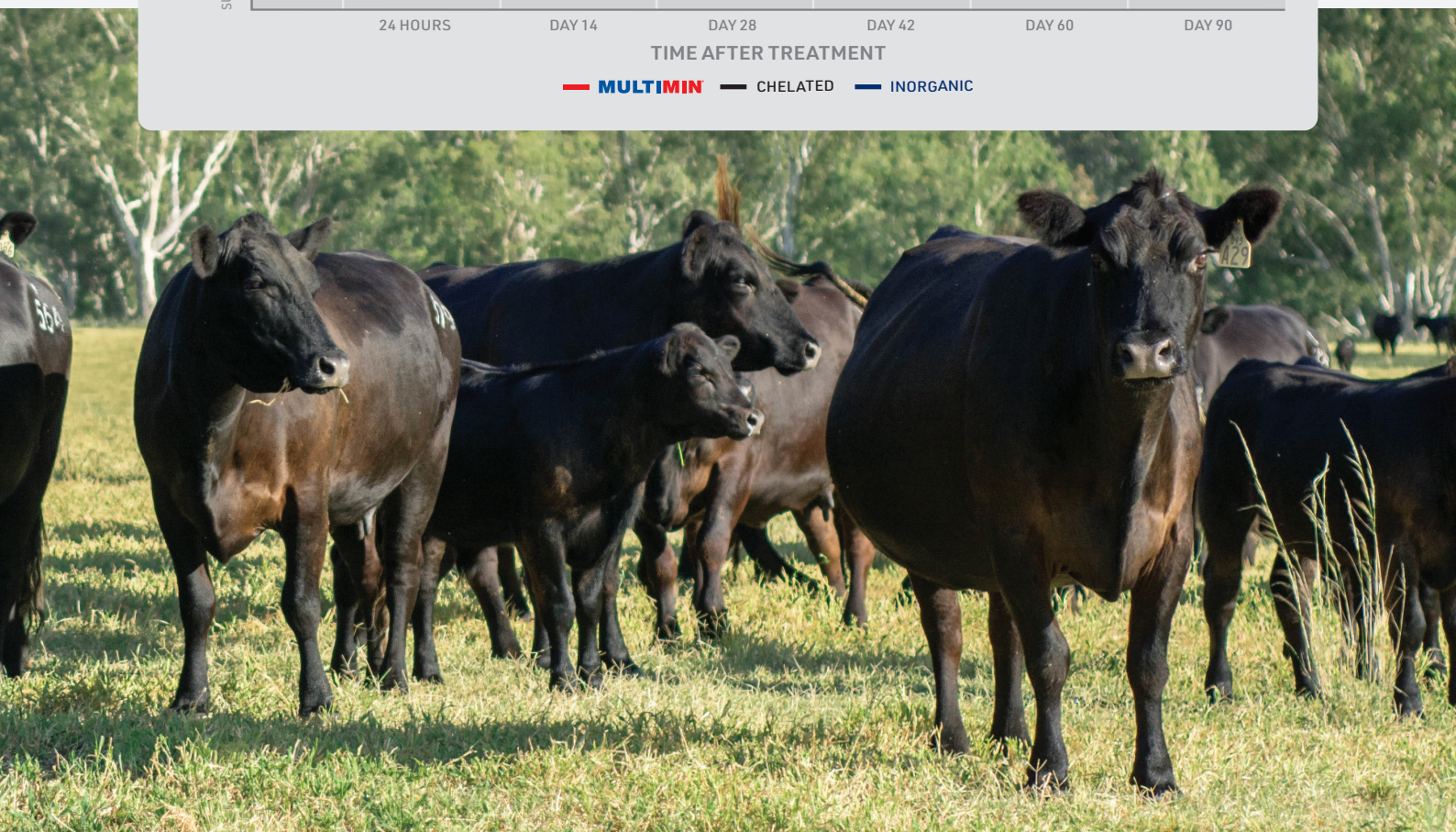
ORAL TRACE
MINERAL ABSORPTION

Multimin provides faster and targeted delivery of a specific amount of trace minerals to individual animals that bypass antagonism in the rumen and support high demands.[14,45] Multimin is absorbed into the bloodstream in as little as two hours after subcutaneous injection[60] and reaches the liver in 24 hours, boosting the levels of trace minerals providing sustained antioxidant activity for up to 90 days, which will help to meet the requirements of modern cattle at high-demand periods.[56,57,61]

Multimin is not a replacement for year-round oral trace mineral supplementation in feed or water. Consider using Multimin and oral supplements as part of a complete nutrition program to optimise livestock performance.

SCHEMATIC REPRESENTATION OF TRACE MINERAL ABSORPTION AND LIVER STORAGE OF MULTIMIN AND ORAL SUPPLEMENTS[56-58]





THE MULTIMIN CATTLE RANGE

	MULTIMIN® CHROME FOR CATTLE	MULTIMIN® EVOLUTION FOR CATTLE
CHROMIUM	5 mg/mL as chromium chloride	NA
ZINC	40 mg/mL zinc as disodium zinc EDTA	60 mg/mL zinc as disodium zinc EDTA
SELENIUM	3 mg/mL selenium as sodium selenite	5 mg/mL selenium as sodium selenite
COPPER	15 mg/mL copper as disodium copper EDTA	15 mg/mL copper as disodium copper EDTA
MANGANESE	10 mg/mL manganese as disodium manganese EDTA	10 mg/mL manganese as disodium manganese EDTA

WHY THE MULTIMIN RANGE?

- Multimin stands out as the leading injectable trace mineral brand on the market, substantiated by more than 50 peer-reviewed studies. This extensive research underscores our commitment to providing scientifically proven solutions for animal health
- The Multimin range features distinct trace mineral injection formulations designed to enhance performance when it matters most. Multimin improves productivity by significantly enhancing fertility and immunity[29-53,63-67]
- The Multimin range for cattle delivers a low-volume formulation that is rapidly absorbed and efficiently utilised. Multimin boosts trace mineral levels in cattle to support high-demand periods such as weaning, joining, calving, transport, transition period, heat and cold stress, and induction to feedlots when your livestock need it most

THE MULTIMIN **PROGRAM** FOR CATTLE

BEEF PROGRAM	Cows and heifers	Weaners	Feedlotting/backgrounding
	30 days pre-joining^	At or before weaning	Before or at induction
	30 days calving		

DAIRY PROGRAM	Cows	Heifers	Calves
	30 days pre-joining^	30 days pre-joining^	At birth
	At or before dry off	30 days pre-calving	Every 3 months

^6-8 weeks before artificial breeding (Fixed Time Artificial Insemination, Embryo Transfer, Multiple Ovulation Embryo Transfer).

BULL PROGRAM*	90 days pre-joining
	At joining

*Treating bulls with Multimin Evolution[62] 90 days before joining, semen collection, or breeding soundness evaluations can benefit semen quality. Trials have shown a 22% increase in sperm concentration and improvements in motility and morphology, which resulted in more bulls passing the exam.[63-67]

WITHHOLDING PERIODS	Milk Withholding Period	Meat Withholding Period	Export Slaughter Interval
	NIL	NIL	NIL

MULTIMIN
DOSING & ADMINISTRATION

Multimin[18,62] is administered as a low-volume subcutaneous injection at 1 mL / 50 kg in young cattle (up to 12 months), 1 mL / 75 kg in yearlings (1–2 years) and 1 mL / 100 kg in adult cattle (>2 years).**

Age	Live weight (kg)	Dose (mL)	Doses per pack (500 mL)
Calves up to 1 year 1 mL per 50 kg	25	0.5	1000
	50	1.0	500
	75	1.5	333
	100	2.0	250
	125	2.5	200
	150	3.0	166
	175	3.5	142
	200	4.0	125
	225	4.5	111
	250	5.0	100

Age	Live weight (kg)	Dose (mL)	Doses per pack (500 mL)
Yearlings from 1 to 2 years 1 mL per 75 kg	190	2.5	200
	225	3.0	166
	265	3.5	142
	300	4.0	125
	340	4.5	111
	375	5.0	100
	415	5.5	90
Adult cattle over 2 years 1 mL per 100 kg	400	4.0	125
	500	5.0	100
	600	6.0	83
	700	7.0	71
	800	8.0	62
	900	9.0	55
	1000	10.0	50

Round down to the nearest 0.5 mL

**Multimin can be administered concurrently with other animal health products. If in doubt, consult your veterinarian. DO NOT use concurrently with drenches, boluses or other animal health products containing selenium or copper. DO NOT MIX products with Multimin in the same syringe prior to administration. Always inject high on the neck, multiple injections should preferably be given on different sides of the neck, according to product label instructions.

MULTIMIN®

WHEN IT MATTERS

BACKED BY SCIENCE. BECAUSE IT MATTERS.

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The benefits outlined in the above scientific studies may not necessarily be registered label claims. Some of these benefits were observed in cattle meeting or exceeding NRC trace mineral requirements provided by oral supplementation.

*The Multimin® formulation used in this study may differ from the formulations registered and / or commercialised by Virbac in Australia

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