

WATER MEDICATION

A broad overview of the application of liquid nutrients for livestock, and the management practices required to operate a medication programme successfully.

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WATER MEDICATION SPECIALISTS

Water medication has been used by producers within the livestock industry for some 25 years, but failure of dispensing equipment during this period, resulting in animal fatalities, created a negative attitude towards this management concept. Technology in recent years has addressed these previous problems, **and water medication today provides the most accurate medium in animal nutrition administration.**

Pearl Rural Services is an advisory and consulting service, specialising in “water medication” to the livestock industry, based in Mitchell, South West Queensland. clients cover all Australian States and New Guinea with a limited number in U.S.A. and South America. Extensive work and installations have been carried out with the Live Export shipping trade, in both feed yards and export ships.

A full and comprehensive advisory service is available - from preliminary feasibilities through installation to feeding and dosing programmes.

An ongoing technical support service ensures the user continuing updates in technology and new products for use in water administration.

Animal Health Companies will ultimately have registered products available to treat internal and external parasites through water, plus treatments for ailments common to grazing animals.

General livestock management will change dramatically for producers and feeders with water medication already in place.

Industrial Estate, St. George Road, Mitchell, Qld. 4465 Australia.

WHAT IS WATER MEDICATION.

Water medication is simply the terminology used when dispensing liquid supplements into the drinking water for livestock.

Likewise a water medicator is the applicator used to dispense or inject the appropriate supplement.

The “medicator” or “dispenser” can also be used to inject fertiliser into irrigation water in drip systems for e.g. olive or paulownia plantations as well as hydroponics.

WHY USE WATER MEDICATION

Water medication provides the most accurate medium in animal nutrition administration.

When a known amount of nutrient is injected into a given quantity of water, all animals receive the required daily amount, as each animal will drink proportionate to their body weight. Unlike dry licks or blocks, where 10% of animals will overconsume, 10% miss out completely and the other 80% receive varying amounts, those animals on medicated water, each and every beast receive the required amount on a daily basis.

Cost Efficiency - Feeding high levels of urea cost between 15c – 18c/head/week, compared to blocks and dry lick of approx. 45c/head/week.

Problems with both shy and greedy feeders are eliminated.

Stock spend less time around watering points, as there are no attractants to keep them there.

With adjustments on medicator, extremely accurate levels of nutrients can be administered on a daily basis.

WHO CAN USE WATER MEDICATION.

Water medication is only successful when surface water is absent. Otherwise it can be used on any equipped watering point, from single trough application to complex reticulated systems.

Water sources from low head – low pressure (eg. Turkey nest) to high pressure systems are suitable, and flow rates can be measured from a “dribble” to 1 million litres/day.

N.B. If surface water is present in the same paddock, then daily intake of nutrients can vary if stock move to unmedicated water, plus a toxicity problem exists when high levels of urea are being fed.

It is also worthy of note, when using water medication DO NOT feed other supplements in conjunction.

HISTORY OF WATER MEDICATION.

Producers have been using water as a medium of supplements for 25 years or more. Hand delivery had a history of high mortalities eg. overdosing with urea and fertilizer grade MAP as a P source put directly into turkey nests caused blue green algae and subsequent deaths.

Numerous mechanical units came and went on the market, but were all phased out due to breakdown and resultant high mortality in stock.

The 1990's represented a period of new technology in the industry and with it a better understanding of the concept. New products became available specifically for medication, and distinct advantages in controlled supplement programmes were recorded and monitored.

Producer education has been necessary in latter years, as distrust of dispensing systems was a legacy from mortalities experienced in earlier systems.

Peart Rural has been providing this education the last 6 years in every state in Australia and are recognised now as the only true advisory service available on water medication.

WATER MEDICATION TODAY

Through education and availability of reliable dispensers and suitable liquid products, usage of water medication has been accepted by a vast number of producers as being an efficient management practice.

Northern Australia predominately uses medication for feeding protein and phosphorus, Victoria and Southern New South Wales mainly trace minerals and to a lesser extent magnesium for grass tetany, whilst Western Australia uses a mix of minerals and protein.

Cattle producers are by far the larger users probably because of a more viable industry, with feed lots and exporters being the latest to exploit the benefits.

WATER

Water, the carrier of the concept, should be scrutinised closely to evaluate if the supply is suitable. Water quality can affect product usage.

WATER ANALYSIS:

Relative state Government Departments or some town councils can organise comprehensive analysis.

Ph:

Of paramount importance - High Ph water can create layering of urea in the solution. Heat is absorbed when urea is dissolved in water and the solution becomes very cold. The density of the solution also increases and it is possible then that a dense cold layer may form at the bottom of the concentrate tank. This cold layer is at super saturation and highly toxic. Proper mixing of product is of prime importance.

Loss of product can also occur in the concentrate tank as Ammonia (NH₃), and at high levels can sometimes be noticed at the trough.

Ideally the Ph should be about 7.2. Over 8 is high, although it has been known that in a number of instances 8.2 has shown no adverse effects.

Acid is added to high alkaline water in the concentrate tank to lower the Ph. Acid must be added to water NOT vice versa.

Diluent should be 1 part of acid to 20 parts of water. Litmus paper or a pool test kit can be used to check and adjust Ph. Commercial Ph probes are expensive – about \$300.

Calcium & Magnesium:

Check the Calcium (Ca) and Magnesium (Mg) cations (+ ions) - phosphorus can form calcium or magnesium ammonium phosphates. These components are insoluble and precipitate out of solution. Product selection, when using Phosphorus, is of prime importance. Chelated products are preferred.

Use of MAP can form a hard scale in pipelines (chemical analysis will show a high % of P and Ca) particularly where the Ca and P cations exceed 90-100 mg/lit.

High calcium levels can also cause Calcium Carbonate crystals to form and accumulate, particularly at bends and low points in pipelines. This can be a potentially serious problem.

Addition of acids generally overcome these problems, as both Calcium Carbonate and Magnesium Ammonium Phosphate are soluble in, and will not form in, acid solutions.

Hydrolysis of urea in the pipeline system can also occur (NH₃ released) giving an ammonium odour at the float valve.

A number of commercial products are available to clear pipelines. Eg. "Rydlyme" a biodegradable descaler. (Material attached)

Changing Water Quality:

A recent addition to the arsenal is an Australian developed magnet technology. These magnets rearrange the molecular structure of the fluid (north/south), apply a positive electrical charge to the normally negatively charged water and reduces the surface tension of the water molecules. This reduces water hardness by preventing calcium in water from crystallising and causing scale build-up. Iron scale can be reduced and salt can be reduced if there is adequate calcium in the water.

The magnets are not a cure for all water problems but seem to be an effective answer in some circumstances. For more information on magnets contact Ian Gundrell in Mackay on Ph. 07 4942 6351

UREA

Because of its toxicity, urea requires care in usage. The following guidelines may help when considering a programme.

Feeding levels should commence gradually. Start initially @ 20gms/head/day for 10 days, increase to 40gms/head/day for next 10 days, then increase to desired level. Numerous producers achieve regular levels of 60gms/head/day, but a number of management variations at this level can create problems. Eg. unexpected surface water, fresh cattle being introduced.

Complete mixing of product in concentrate tank must be done. Either mechanical or physical mixing is suitable, ie. hand stirrers, fire fighter, mechanical agitator.

Sulphate of Ammonia should be fed in conjunction at the rate of 10% to 20% of mix. (20% at higher levels.) Sulphur is necessary for utilisation of urea in the rumen.

Levels of urea greater than 2gms/1 litre of water in the trough may cause a depressed intake. It is recommended that this level stays below 1.5gms/1litre to alleviate this problem. Thus in Winter when intakes are low, sometimes high levels are unable to be fed. This is particularly noticeable in high alkaline water.

Average daily water intake must be monitored, so that accurate calibration and dosing can be made. Daily intake can double from Winter to Summer so adjustments are made accordingly.

Other protein supplements must **not** be fed when feeding high levels of urea in water.

Care must be taken surface water is not available in conjunction with medicated water.

Product grade varies from State to State. Prilled urea is preferable (Western areas) – Stock feed grade in Queensland and Northern Territory.

Stock grade is granular screened – providing only small granules and hence more soluble.

When ordering prilled urea, request the lowest level of birit, as sludge will accumulate in the bottom of the concentrate tank from the higher level.

Tanks should be cleaned at the end of the feeding programme.

OTHER PRODUCTS & USES

PHOSPHORUS:

Phosphorus sources can create blue green algae growth in concentrate tanks and to a lesser degree in troughs. N.B. Maxi Phos has anti fungal and bacterial inhibitors.

U.V. rays can penetrate fibreglass and plastic tanks causing algae growth, hence poly tanks are by far the best choice. Ensure a solid manhole cover.

- Products:**
- (a) Most recommended product is Maxi Phos – a product of Verbac. It is a clear liquid, easily mixed and chelated process, therefore does not react with other elements.
 - (b) Technical grade M.A.P. – This has cadmium and fluorine removed. E.g. “Liquifert” from Incitec.
 - (c) Phosphoric acid is used to a much lesser degree, but can be useful in high alkaline water to lower the Ph. As well as provide a P. source.

TRACE MINERALS:

- (a) Maxi-Min – another product of Verbac – a liquid additive which we recommend.
- (b) Various seaweed derivatives. E.g. Nutrimol or Vitec. Nutrimol is used to some degree in Southern areas.
- (c) Separate trace elements are used but not recommended due to reactions with basic products.
e.g. Copper Sulphate will react with M.A.P. giving formation of copper carbonate deposits in pipes and tank.

Most common minerals used are:-

Copper as CuSO_4
Zinc “ ZnSO_4
Selenium
Cobalt.

SUNDRY OTHER USES:

Electrolytes
Anti Bloat
Antibiotics
Magnesium – grass tetany
Fertiliser – drip systems

GENERAL INFORMATION

NUTRIENT TANK:

- (a) Needs to be poly – not fibreglass or clear plastic. U.V. rays penetrate the latter and with the inclusion of Phosphorus, blue green algae will result.
- (b) Should be a “squat” model, maximum of 1200mm high.
- (c) Solid lid on manhole and preferably no overflow.
- (d) Lid on top should drain away from tank – some manufacturers have self collecting tops and drain back into the tank.
- (d) Most popular size is 500 gall.

MEDICATED WATER:

Medicated water should not be pumped to turkey nests. Storage tanks can be filled but care should be taken that a reasonable throughput of water happens daily, e.g. you would not put medicated water into a 20,000 gal. Tank with only 20 head watering off this supply.

STORAGE TANKS:

Storage tanks if used should be enclosed, as some loss of product will occur.

PLUMBING:

Preferably all poly fittings, poly ball valves etc. Sizes to suit pipe dimentions.

FEEDING PROGRAMME:

IDENTIFY THE PROBLEM THEN ADDRESS IT.

Dung sampling should be done before any supplement programme Results will give faecal N and P levels. When N level is 1.2 or below, urea feeding should commence – growth rate ceases at this point.

Agri-Food Laboratories, P.O. Box 549, Toowoomba. Qld. Handle a simple test

Phone (07) 46 330599

Or

David Coates, CSIRO Davies Laboratory, Private Mail Bag P.O. Aitkenvale. Qld. 4814

Phone (07) 47 538500

END USER GROUPS

- A. Largest by far being cattle producers.
- B. Cell grazing producers
- C Dairy Industry
- D Sheep producers to a lesser degree
- E Electrolytes to live exporters, trucking yards, meat works, transport and rail depots.
- F Feed lots
- G Hydroponics
- H Drip feed systems - eg. Olive Plantations.

WATER MEDICATION NARWIETOOMA PRODUCER DEMONSTRATION SITE UPDATE

Keith Hill
Advisory Services - Alice Springs

This Producer Demonstration Site has been running at Narwietooma Station since December 1998 and is due to finish in December 2001. This is a two part trial with the first part (1998/1999 completed) using mixed age breeders and the second part (1999/2001) using first calf heifers.

Mixed Breeder Groups: Background & Results.

The cattle were split into two even groups by weight and pregnancy status and put in two paddocks of about 60 km² each. These paddocks were fenced from one larger paddock and they have very similar land types. One group of 150 breeders (**the treatment group**) was supplemented through the water troughs from December 1998 until October 1999 and the other group of 150 breeders (**the control group**) did not receive any supplementation. Data was collected from these 300 breeders plus progeny in December 1998 and again in April, August and October 1999. The data collected from the trial animals was weight, pregnancy status, fat score, wet/dry status and weaner numbers and weights. Faecal and blood samples were taken from 20% of the cattle in each group to determine phosphorus and nitrogen levels.

Results to October 1999 from the start date in December 1998 showed positive responses in weight gain, pregnancy rates, more weaners and fewer missing breeders in the treatment group. These results added up to an estimated nett financial advantage of \$28551 to the treatment group. The final results indicated a leveling off of performance of the treatment group compared to the control group between August and October. This was due to good storms in the paddocks in early October with surface water and green pick available to the stock. Because of available surface water stock had moved off the water medicators for several weeks before the final data collection. Results of pregnancy rate, cow weight, fat score and missing cows to October 1999 are shown in Table 1. Results for weaners are shown in Table 2.

Table 1. Treatment group breeder advantages December 1998 to October 1999 compared to the Control group

Pregnancy rate	Weight	Fat Score	Missing cows
+13%	+42(kg)	+ .6 (scale of 1 to 6)	+36 cows

Table 2. Treatment group weaners gain December 1998 to October 1999 compared to Control group

Group	% Weaners	Av. Weaner wt (kg)	Total Weaner wt (kg)
Treatment	87	202	28019
Control	62	202	19412
Difference	25	0	8607

Using this data and the following assumptions the approximate financial advantages to the treated group over the untreated group areas are as follows: (The assumptions are made from cows present at the final data collection and the numbers weaned during the trial)

+13% pregnancy in treated group. 141 head x \$50 x 13% per pregnancy	=	\$ 916
+42 kg advantage in the treated group. 141 head x 42 kg x 90c per kg	=	\$ 5330
+8607 kg advantage in the treated weaners. 8607 kg x \$1.30 per kg	=	\$11189
36 more cows missing presumed dead in the control group. (Not found in 2 years)		

36 @ 409 kg (average weight at final weigh) x 90c per kg	=	\$13252
Gross financial advantage of treated over control group	=	\$30687
Less cost of supplement. 141 cows x 300 days x 5.05c per day (\$15.15/head) (supplement cost assumes stock drank 40 litres per day)	=	-\$ 2136
Nett financial advantage to treated group	=	\$28551

The nett benefit to cost ratio was greater than 13:1 (\$202 per cow)

Heifer Groups: Background & Results

A group of 280 heifers that were joined in April 1999 were split into two equal mobs and replaced the original trial cattle in October 1999. The water medicators were swapped between the two paddocks. It is proposed to collect two years of data similar to that collected from the mixed breeders.

There was exceptional rainfall in 2000 which meant that due to the availability of surface water the treatment group were supplemented for less than half the year. Due to the difficulty of mustering stock when surface water is available there were only two data collections in July and November 2000 instead of the three that were originally proposed. 80% of the heifers in each group were mustered. The control group had a weight advantage over the treatment group.

Three reasons help explain why the treatment group were lighter than the control group.

- Firstly, there was a bigger number of weaners in the treatment group which put more pressure on the heifers in the treatment group than the control group.
Secondly, there was 210mm more rainfall recorded in the control paddock than the treated paddock which would have advantaged the control group.
Thirdly, due to the exceptional season, both groups were on surface water for over half of the year 2000 which limited the supplementation the treatment group received.

The results for the heifers are shown in Table 3 below.

Table 3. Heifer information to November 2000

Group	Average Weight (kg)	% Pregnant	% Wet
Treated	417	69	72
Control	452	65	63
Difference	-35	4	9

Weaner results are presented in Table 4 below

Table 4. Heifer groups weaner information to November 2000

Group	% Weaners	Average Weaner Weight (kg)	Total Weaner Weight (kg)
Treated	86	227	21111
Control	68	214	16264
Difference	18	+13	+4847

The Future

The paddocks will be mustered in June and November 2001. Due to the availability of surface water cattle have been off supplementation for most of 2001 until early May. Because of this, no significant results are expected from the June muster and data collection. The November muster and data collection will complete the trial and final results will be published.