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THE IMPORTANCE OF TRACE ELEMENTS AND PLANT TESTING THIS SEASON

Brooke Anderson, CSBP Agronomist

TRACE ELEMENTS

One of the first questions I will ask you when we are looking at your soil tests and developing your fertiliser program next autumn is 'How long has it been since you have used trace elements'? The most common answer to this question is 'Longer than I can remember'.

When I first started working as an agronomist in this area 13 years ago the rule of thumb had been that trace elements, in particular Copper, Zinc and Molybdenum, should be applied every 10 years. The field trials, research and paddocks I have seen since then have changed this rule of thumb. With new varieties, improved grazing strategies, increased liming and sound fertiliser strategies we are pushing production like never before. With dry land farms targeting 10t/ha/yr dry matter and irrigated areas targeting 18-20t/ha, we now know the rule of thumb should be more like every 5 to 7 years.

Trace element deficiencies are very hard to pick by the eye as it usually just results in a loss of production and smaller leaves. These elements are only needed in small amounts but have a large impact when short in supply.

Of particular importance to trace element availability is soil pH and application history. Figure 1 illustrates the relative availability of different trace elements in soils affected by soil pH.

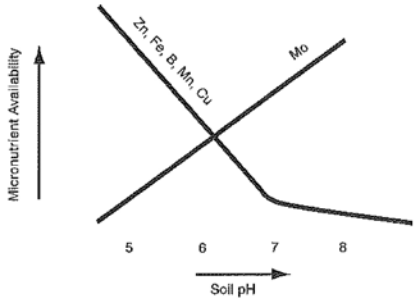


Figure 1 Relative availability of micro-nutrients as affected by soil pH (source: Australian Soil Fertility Manual, 2000)

Copper is necessary for chlorophyll formation in plants and is also involved in providing structural strength through lignification. In plants well supplied with copper, cell walls are stronger, higher polymers and proteins are formed and consequently, they are more resistant to fungal attack. It is also involved in the flowering process which is integral for seed set.

Zinc deficiency in agricultural plants has been widely reported in WA. The need for this essential micro-nutrient was first established in the 1930's, when its importance to the growth of cereals and pastures was demonstrated. Since that time zinc application has become an important aspect of agriculture in south-western Australia.

Molybdenum plays a particular role in the process of symbiotic N-fixation by Rhizobia bacteria in legume root nodules. In other words, it helps your clover convert all that nitrogen in your organic layer into a usable form for your ryegrass.

PLANT TESTING

The only accurate way to know how your pastures are tracking with trace elements is to conduct a plant test. Plant analysis is a very powerful yet under utilised tool for assessing all pasture nutrition requirements.

Plant analysis is used to demonstrate what is happening nutrition-wise to an actively growing pasture. This insight can avoid potentially costly decisions and maximise the efficiency of your fertiliser dollar.

Plant sampling is a simple task of grabbing pasture as if you were a cow grazing (you need to tear it off around 5cm above the ground), walking across a site to obtain a representation of different areas of the farm. Once you have filled the box, in your kit you're off to the next site.

If trace elements are required the best option is to change your autumn fertiliser application to include copper zinc moly (eg. Super Copper Zinc Moly or TEK Phos). These products contain the trace elements in every granule of the Super component, which is very important as the rates required per hectare are very small but each plant root needs to be able to reach some.

I find that through plant testing we can identify areas that are becoming low before the deficiency causes a loss in production. This also means that we can spread the application of trace elements over a couple of years which can help with evening out the budget and not having a sudden increase in costs in a single year.

I look forward to interpreting your plant test results and assisting you with any nutritional queries you may have.

If you require further information on CSBP Plant Analysis please don't hesitate to give me call on 0427 997 869 or brooke.anderson@csbp.com.au

Boyanup Forage Field Day Produces Interesting Outcomes P4

THE CRUDENESS OF CRUDE PROTEIN

(PART 1 OF A 3 PART SERIES IN FEED PROTEIN QUALITY AND UTILISATION)

Dr. Bronwyn Edmunds (PhD) | Dairy Research Officer, DAFWA

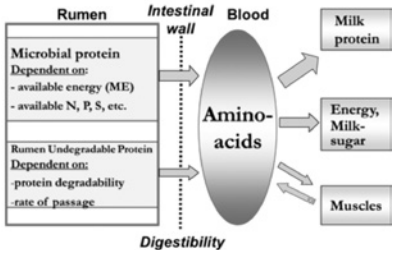
In Australia, it is the norm to base dairy cow rations on one simple measure of protein; crude protein (CP). Most of us know roughly how much CP a ration should contain for cows of various lactation stages (about 18% for fresh calvers and 15-16% for mid lactation cows) and aim to balance rations to meet these minimum standards.

However, just how much CP is effectively used by the cow and how much is excreted is largely dependent on CP quality of feeds making up the ration. An imbalance in CP supply to both rumen microbes and the cow can lead to inefficient CP utilisation and could be costing you money through oversupply of expensive protein supplements and decreased milk protein yield.

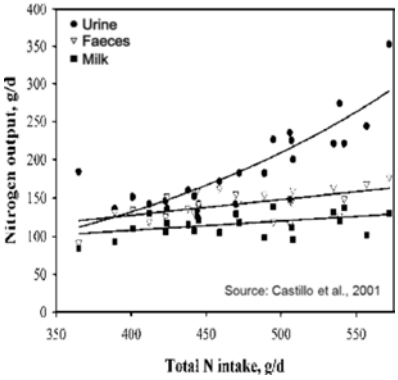
To better understand protein supply and metabolism we need to start by defining CP. Basically all you need to know is that CP represents ALL nitrogen (N) in a feed. However, like all aspects of dairying, feed N is complicated. In ruminant feeding, protein is commonly characterised as rumen degraded (RDP) and undegraded (RUP, also known as UDP or bypass protein).

Another important protein value is metabolisable protein (MP). The concepts of RDP, RUP and MP are somewhat familiar in the farming community but not always well understood and are certainly not well applied.

In order to understand why RDP, RUP and MP are important, we need to think of the dairy cow as two organisms that must be fed; the rumen microbes and the cow. Nitrogen (N) requirements of microbes must be met through a RDP supply in the rumen. Amino acid requirements of the cow must be met through MP supply to the small intestine. Figure 1 gives a basic overview of protein metabolism in the dairy cow. CP entering the rumen is either degraded or remains undegraded. Degraded CP may be utilised by rumen microbes for growth and reproduction, provided they have an adequate supply of energy. An oversupply of N from RDP will diffuse through the rumen wall and be lost through urine excretion, which in itself requires use of energy otherwise available for production. Microbes constantly pass out of the rumen and flow on to the small intestine where they provide the cow's main source of amino acids (60 – 90%). The other major supply of amino acids comes from RUP. RUP depends on protein degradability, which can be broadly categorised into 5 levels and will be dealt with in the next article. RUP also depends on the level of feed intake. Generally speaking, higher DM intake leads to higher RUP and microbial protein for any particular ration. Together, microbial protein and RUP make up the basis of MP i.e. the digestible supply of amino acids. The amino acids are absorbed into the blood stream and used for growth, energy and milk protein production.



Of course, to ensure both microbes and the cow receive their N requirements you could just feed a diet rich in CP, couldn't you? Unfortunately it's rarely that simple. First of all, that would be a very expensive practice. The cost of lupins rose to $400 per tonne this year, which is about $1,200 per tonne CP! Secondly, excess dietary N is detrimental to the health and fertility of your cows. Thirdly, excess N excreted in the urine is harmful to the environment. Figure 2 demonstrates the huge increase in excreted urinary N as dietary CP increases.



As dairy farmers, what we should be aiming for is higher MP, rather than CP in the diet. The first step is to understand what drives MP up. Next is to understand which feeds are a good source of RDP and which are a good source of RUP. The final step is to formulate rations that will optimise MP supply, using the help of your nutritionist or an easy-to-use ration formulation tool such as Rumen8[1]. Just a simple switch from CP to MP could decrease your protein inputs and increase your output of milk solids!

In the next article of this series I'll explain the protein degradation characteristics of various dairy cow feeds in more detail, with a specific focus on your cheapest protein source; grass.

[1] Rumen8 is a tool developed by the Department of Agriculture and Food WA for farmers and nutritionists to formulate rations. For more information call Richard Morris on (08) 9780 6282.

For more information on feeding protein to dairy cows please contact Dr. Bronwyn, Edmunds (PhD), Dairy Research Officer 0468 456 755 www.agric.wa.gov.au

Feed Contracts – it's all about security

Everyday dairy farmers look at buying grain and entering into feed contracts. Don't make the mistake of thinking the term 'feed contract' means the same as 'forward contract'. Contrary to popular belief, a verbal agreement, such as over the phone, is a legally binding contract. Feed contracts actually make things easier, increasing certainty of feed supply and predictability of feed costs. They also help clarify the obligations for both parties if things go wrong.

Dairy Australia Your Levy at Work

GRAINS 2 MILK From grains to profit

KEY TIPS

- She'll be right 'vs. 'Signed sealed and delivered'? Always confirm verbal agreements with feed suppliers by mail, fax or email, and keep all paperwork in a safe place
- Maintain regular communication with suppliers, particularly if supply starts to look doubtful
- Price is only one of the key components in any contract, always remember quality and supply are important
- Use a check list to cover the five key points when entering into an agreement with a feed supplier:
  1: Quantity, 2: Quality, 3: Time, 4: Place, 5: Price and payment terms

For more information on feed contracts and buying feed – see Grains2 milk Fact Sheet 10 at www.dairyaustralia.com.au and for formal documents to use as grain contracts visit www.graintrade.org.au

FEEDING MAIZE SILAGE TO DAIRY COWS

Trevor Schoorl, Technical Services Manager, Lallemand Animal Nutrition / Quality Silage Systems

As we know corn or maize made into silage properly is a great feed for dairy cows. As many WA dairy farmers are starting to use this feed there are several critical points that I want to cover off to ensure dairy farmers understand, maximise the returns and ultimately profit from feeding corn silage to their cows. One is the ensiling process and secondly the nutritive value and balancing of the product.

Ensiling Process

(a) Fermentation Process.

Corn plants in our paddocks are covered with both detrimental and beneficial microorganisms. Microbes do all the work during the fermentation process of making good silage. They can also do all the damage if not properly managed.

We need to chop at the correct dry matters, properly pack to exclude any air and create an environment that allows lactic acid producing bacteria in particular, along with others (eg. Acetic and propionic) to break down the glucose and other plant sugars. The lactic acid causes the pH to drop and the acid producing bacteria to stop producing acid. This leaves excess sugars available for the cow's diet which in turn will lead to increased milk production.

(b) Stability Phase.

If silages are adequately packed and at the right dry matters there is a much better chance of the corn silage fermenting into a stable silage mass. Residual oxygen in the silage mass creates an environment for heating and slow fermentations. This has a significant effect on silage quality with degradation of protein and depletion of plant sugars having the biggest effect on forage quality and hence cow performance. This is also very important for silage when exposed to air during the feed out phase. This exposure to air stimulates yeasts that were on the plant at harvest time, to breakdown lactic acid. The yeast then destroys degradable nutrients creating heat and raising the pH. This in turn allows moulds and bacteria to grow creating more spoilage. These moulds and bacteria don't only reduce the silage quality, hence milk production, but they also create mycotoxins which effect, breeding, immunity and other metabolic processes in your cows.

The best way to encourage lactic acid producing bacteria is to use a high quality, properly researched and documented inoculant, such as Lallemand Animal Nutrition's Lalsil HC. The applied technology will assist at both the initial fermentation process and then again at the stability phase. The lactic acid producing bacteria dominate the forage mass ensuring a fast and efficient fermentation. The DNA patented bacteria Lactobacillus Buchneri 40788 included in the inoculant help ensure silage stability at feed out. Controlling the yeast and mould growth in turn maintains a high quality, palatable and hygienic silage for your cows.

The Nutritive Value and Balancing of the product

Energy: Corn silage is well known to be a high energy forage which along with being extremely palatable, makes it a perfect feed option for dairy cows. The energy from corn silage compliments the protein coming from well managed grass and legume pastures, balancing out the cow's diet for high milk and component production.

Protein: This silage can contain 40 - 50% grain on a dry matter basis - hence the excellent energy sources, but is relatively low in protein at between 7.5 - 9% CP. Therefore feeding corn silage alone will not support high milk production, as it is too low in protein. Balanced with concentrate protein sources such as lupins, soybean meal, and canola meal etc. help support higher milk production.

Fibre: Corn silage also has good levels of effective fibre for maintaining good rumen function. The NDF portion is the important fibre in this circumstance. Ensuring proper dry matters at harvest is critical to the maturity of the crop and hence the correct chop length and effectiveness of the fibre portion.

Important

Recent research has shown that total plant digestibility and starch digestibility increase dramatically over a six to ten month period of ensiling. Over 10 months of ensiling, starch digestibility can increase by up to 15% and total digestibility by up to 10%. This means the longer we can leave the corn silage in the stack the more our cows will digest and hence perform from it. Corn silage starch and dry matter digestibility will increase with time in the silage stack, so adjusting rations or diets will be critical to maximising cow health and production.

In summary, Corn Silage is an excellent consistent energy and fibre source for dairy cows. Understanding the ensiling process, getting the key fermentation factors correct and using a high quality inoculant will ensure the highest quality silage possible.

For further information contact Trevor Schoorl, Ph. 0427 715 938 or tschoorl@lallemand.com

Feedbase and The Dairy Innovators Forum

Tammy Negus, RFDG coordinator

In February many WA dairy farmers attended the Australian Dairy Conference featuring the Innovators forum on the Sunshine Coast. This is an annual event for dairy farmers and professionals to invigorate and be inspired by the global industry of dairy. As well as being informative, challenging and raising the industry profile it showcases national and global innovative dairy practices and science.

The WA young dairy farmers gathered to be stimulated by fresh ideas to take home to the farm and network. Some were supported by Western Dairy funding and some supported by Brownes. The group also took part in a tour of some Queensland dairy farms. Kim Gardiner and Steven Noakes both WA dairy farmers noted the dominance of TMR (Total Mixed Ration) systems and the use of maize in the feed programs on the farms they visited.

From Gatton to Toowoomba and through the Darling Downs the abundance of subtropical grass pastures was evident in the area, but due to the high NDF they are not grazed as readily for milk production. Summer crops such as sorghum is grown and due to the climate kikuyu based pastures can be quite productive, especially when over sown with winter annuals and managed well. The tour as well as the 'conference experience' presented some interesting dairy management and feed base strategies.

Calvin Moody presented on the dairy management strategies of 3 dairy farms under his control near South Georgia, United States. Between Brooksco, Jeffco and Westbrook dairies they milk almost 7000 cows which are contained in free stall barns. Simplicity is the overall strategy and Calvin outlined the feeding goals and objectives used to maintain efficiency and profitability of these big dairies based on TMR:

- Identify poor quality feed
- Maintain proper herd count
- Use Correct time of feeding
- Use Consistent feeding time
- Minimize deviations of ingredients (keep average less than 2.5% deviation)
- Keep bagged products, supplements, pits, silos, mixing and feeding areas orderly
- Cleanliness of feeding troughs and equipment
- Get correct readings of dry matter on forages and TMR
- Read feed bunks well and adjust during the week
- Move portable feed troughs when needed and report on surplus uneaten
- Use good equipment operators
- Do not waste feed in any way as this is lost money

Paul Lambert, a Nuffield scholar from Tasmania presented on challenges and opportunities for Large scale dairies. His study finds there are a broad range of opportunities from looking at corporate structures to utilising the energy levels and growth rates of grass varieties. In Australia robotic milking is fast becoming popular and in need for further research to be successful. For large herds benefits of these systems can be coupled with problems related to pasture allocations being too little or too much. Investigating wind turbines, digesters and biomass gasification can produce clean energy and could benefit farms in other ways.

For Further information on the conference presenters and content please visit www.australiandairyconference.com.au

Boyanup forage field day produces interesting outcomes

Mike Gout, Forage Specialist, SeedForce

A field day held at Victor Rodwell's Boyanup property on Tuesday February 28th attracted considerable interest from local dairy producers and advisors. The day focussed on looking at alternative forage options being evaluated on the farm to assess how they may be able to improve production efficiency and profitability. The site was set up by seed company Seed Force, was sown by DAFWA team from Manjimup, and is being monitored and measured by local farm advisor Les Becker from Dardanup Rural.

The trial has been set up to compare annual, bi-ennial and perennial grasses to see how they compare over a 3-4 year period. Whilst annuals are very productive over winter and spring, they require annual re-sowing, so it is of interest to see how biennial Italian ryegrass and perennial options such as perennial ryegrass, tall fescue, festuloliums and cocksfoot would perform over a longer time frame.

Whilst the trial is in its early days, there are some interesting results that have become evident in the first year. Of the annual ryegrass options, there was a range of varieties including USA bred annuals which run to seed early and European varieties which have mid-late heading times, some 7-12 days later than US types. The late season rains in November last year resulted in an extra 3 tonnes of dry matter from the RAGT bred varieties (Adrenalin, Sultan & Speedyl) compared to the Oregro bred varieties (Flyer & Catapult). This highlights the value of using high genetic gain varieties for extra yield. These varieties have also been tested for higher feed quality and have pasture EBV's available highlighting $500-600/ha greater milk value than Tetila ryegrass even after taking seed price into account.

The other interesting outcome was that the Tri-oomph mix of 50% oats, 47% Speedyl ryegrass and 3% Pacer leafy turnip was able to produce up to 1.5tDM/ha more winter feed than straight annual ryegrass alone. This outcome is consistent with data that has been generated on 3 way blends by Seed Force over the past six years. Not only do these blends produce more winter feed (driven by the Pacer leafy turnip), but they provide better nutritional balance (fibre from the oats) and transition out of straight ryegrass in the spring without any loss in yield or quality. This blend combines the high quality of a brassica similar to grain with more feed at first grazing, both providing scope to reduce bought in feed, and the late season production and quality of SF Speedyl ryegrass which is consistently providing 2 silage cuts of higher quality for WA dairy producers.

Victor comments, "The 3 way blend was outstanding and due to its high production we will be seeding 250Ha of this for 2013". "I now have an appreciation of the how some of these ryegrass varieties, can be used in over sowing to fit into our kikuyu/ryegrass", Victor explains.

Of the perennial grasses in the trials, perennial ryegrass had produced almost as much as the two Italian ryegrass options by the end of February. The festulolium (SF Splice AR1 which is a 4 way cross between Italian ryegrass, perennial ryegrass, tall fescue and meadow fescue) was more winter active than other perennials but less productive in spring. The tall fescue was just behind the lowest yielding perennial ryegrass, and the two cocksfoots were a further 1-2tDM/ha behind them or up to 2t DM/ha behind perennial ryegrass. It was interesting to note, however, that in another demonstration area in an adjacent paddock, the cows got through a hot wire and selectively grazed the cocksfoot compared to other perennial grass options sown there.

Feedback from the day also highlighted the contribution of chicory sown in the borders. On another farm in the district a cocksfoot and chicory pasture was delivering a lift in milk production from the chicory despite a poor establishment of cocksfoot hampered by a tough weed infestation.

After reviewing the grass trial the focus shifted to a look at fodder beet, a new option that can deliver up to 40t DM/ha from a 4 month growing and 2 months grazing regime, according to on farm results achieved by research agronomist and advisor David Wisewould. Fodder beet is an exciting option due to its high quality, outstanding yield potential and interestingly its requirement for salt. The 7ha demonstration area highlighted its potential, but timing of weed control is critical and a delay awaiting a contractor significantly impacted its potential.

Key points can be taken from the day:

- **Annual ryegrass** is used for winter and spring feed, but if you are not planning to crop the paddock over summer, use later flowering types, but check for data on flowering times and feed quality
- A **3 way forage blend** (SF Tri-oomph) can deliver up to 1.5t DM/ha more winter feed than annuals alone with no compromise to spring yield or quality.
- **Italian ryegrass** options had produced the most feed by the end of summer, followed by the **festulolium, perennial ryegrass, tall fescue and cocksfoot.**
- **Chicory** is a sound inclusion into pasture mixes to lift milk production. It is suitable for grazing and silage, but not for hay production.
- **Fodder beet** should be capable of producing 20-40t DM/ha over summer for feeding at 5kg/ha during autumn whilst new pastures are getting away.
- Sowing on time and targeting weeds is critical if target yields are to be achieved.
- **Maize** is being grown to produce maximum starch per hectare but choose your variety carefully and according to Dean Fry of HSR Seeds, most producers are harvesting too early and reducing potential yields by 150-300kg DM/ha/day if cut too early.

For more details on the trial results and information on seed and forage varieties contact Mike Gout on mobile 0418 100 390 or email mikegout@seedforce.com or Les Bekker on 08 97281011 or lesb@dardanupstore.com.au

Farmers and industry members inspecting the forage varieties on Rodwell Farms

The impressive fodder beet plants grown in the demonstration site at Boyanup

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To contribute to the Feedtrough please email Tammy at tammy.negus@gmail.com