

Australian feed grains supply chain

In recent years GRDC has funded work to better define the nutritional quality of cereal grains for feeding poultry, pigs, sheep and cattle. This work under the 'Premium Grains for Livestock Program' has been able to produce near infrared (NIR) calibrations to allow the rapid analysis of grain to define its nutritional value," said Mr John Spragg of JCS Solutions Pty Ltd. This technology is now being assessed by commercial operators within the feed grain supply chain.

The benefits of using NIR available energy calibrations are seen as:

- Growers and marketers have ability to define which grain parcels are better suited to either pig, poultry or ruminant feeding.
- Ability to better utilise feed grain based upon known energy content.
- Quantitative assessment of quality for 'weather damaged' grains and reduced automatic price downgrading.
- A rational means of establishing feed grain quality which can be used for negotiating supply price.
- Feedback to plant breeders seeking to breed varieties with higher available energy content.

Mr Spragg indicated that; "grain supply and demand is the greatest concern for feed manufacturers and the livestock industry. The continuing influence of dry seasonal conditions has provided another below average winter cereal crop, with the 2007 harvest expected to see a further decline in carry-over stock held within storage facilities. The tightening Australian supply-demand equation, together with higher global grain prices, has resulted in a significant rise in domestic feed grain prices. "

Domestic demand of cereal grains for animal feed is estimated at over 9 million tonnes per year. Of this, Queensland and northern NSW use over 3 million tonnes. In poorer years, additional feed grain is required from interstate to satisfy Queensland's demand, with increased pressure on buyers to accept lower quality grain for a higher price.

"The eastern states requirement for feed grain is the largest market by volume, with cereal feed grains greatly exceeding

that used in domestic flour milling and malt production. The cereal grain surplus available for export from Qld, NSW and Vic has been declining as the livestock industries continue to grow", said Mr Spragg.

The complex supply chain involves many large multi-national companies, national grain marketers, individual growers through to end user livestock producers. Supply routes involve grain agents, feed manufacturers and freight handlers. There are benefits in short supply chains, utilising on-farm storage with direct delivery to livestock producers as well as the benefits associated with major grain marketers.

"Higher livestock production costs due to soaring feed grain prices has resulted in production costs exceeding sale prices of poultry, pork, beef and sheep meats. This diminishing sales return is resulting in fewer animals on feed as producers reduce stocking levels to decrease their exposure and scale down their operation" said Mr Spragg.

It is highly likely that during 2008 there will be a need to transport larger volumes of grain from either South Australia or Western Australia to meet feed demand in Queensland and NSW. "There may be a feed grain shortfall on the eastern seaboard which will require the importation of close to 1 million tonnes of raw materials. Materials already being imported include palm kernel meal, copra meal, soybean hulls, millrun pellets and soybean meal. Other raw materials such as corn gluten and dried distillers grains may also be imported" said Mr Spragg. Access to importation of whole grain is limited to use within metropolitan feed mills with steam pelleting equipment.

There will be pressure placed upon expectations of a good summer crop from Queensland and northern NSW. What the feed grain market is wanting is a greater and more reliable supply of feed grains to allow the production of livestock at competitive operating costs relative to world markets. Ideally there would be a more consistent supply of feed grains for the domestic feed market, with less requirement for the importation of stockfeed raw materials.

Market volatility continues to be a significant risk factor for both grain growers and livestock producers. Further work

to define the various drivers within the Australian feed grain market and areas for improvement are being studied to benefit both grain growers and feed grain end users.

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GRDC project: JCS00002

Premium grains for livestock – quality pays

“Currently, grains traded for livestock consumption do not take into consideration the energy value to animals. With the introduction of NIR (near infrared) calibrations, both grain growers and animal producers will know the grain value for a particular livestock type, allowing a fair price to be negotiated”, says Dr John Black, Program Coordinator for the GRDC’s Premium Grains for Livestock program. “At present, if grain fails the human market specifications it is down graded to ‘feed quality’ with the grain often losing considerable value. Energy calibrations for each grain and animal type have been calculated and may soon be used commercially”, explained Dr Black. Intensive livestock industries are similar to other manufacturing industries where the quality and suitability of raw materials can greatly impact production efficiency, product quality and profit.

The Premium Grains for Livestock Program is funded by the GRDC, other animal research and development organisations and Ridley Agriproducts to define the range and causes for quality variation in cereal grains for different livestock types. From 3,300 samples varying widely in species (wheat, barley, triticale, oats and sorghum), cultivar and growing conditions, 200 grains have been selected by NIR spectrometry and in vitro fermentation/digestion assays then fed to sheep, cattle, pigs, broilers and layers to determine production efficiencies”, said Dr Black.

Grain value depends on the energy available for metabolism (MJ/d) - a factor of the energy released during digestion (MJ/kg) and the amount of grain consumed (kg/d).

Some key findings of the Premium Grains for Livestock are;

- The energy value of individual grain samples varies widely between and within grain species and animal types.
- Grains with high digestibility do not necessarily promote high intake and levels of animal production.
- Individual grain samples are often more suitable for one animal type than another.
- Different characteristics of grains determine digestibility and intake.
- Available energy of sorghum for cattle was extremely low at 10MJ/kg DM, which is in contrast to other animal types. However a waxy sorghum variety fed to cattle improved available energy by ~3MJ/kg DM.

“There appears to be an inconsistent relationship between the available energy content of grains across animal types when the same grains were fed to cattle, pigs, broilers and layers”, said Dr Black (see Figure 1).

Economic value of variation in grain quality

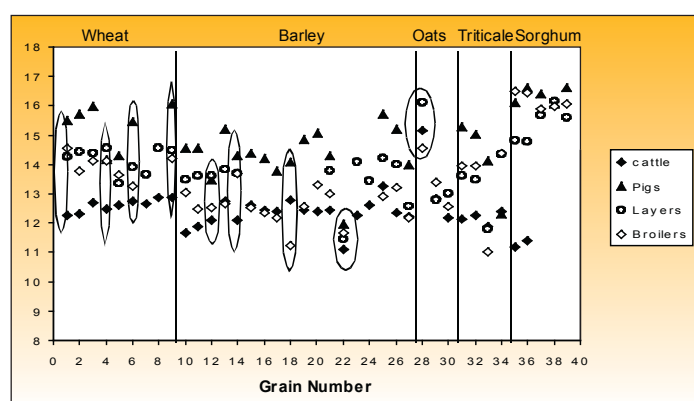
Dr Black indicated “the economic implications of varying the available energy content of a grain by 1 MJ/kg for the major classes of livestock was estimated using standard least-cost feed formulation techniques, assuming typical Australian diets and ingredient prices (Table 1).” He explained “the relative lower cost of 1 MJ/kg for dairy cows was due to the assumed high intake of pasture and forage by these animals.”

Table 1. Economic implications for livestock industries of increasing the available energy content of cereal grains by 1 MJ/kg.

Industry sector	Change in grain value (\$/t) for a change of 1MJ/kg
Pig	14.30
Broiler	26.90
Layer	24.07
Feedlot	14.20
Dairy	7.48
Average	17.39

For example, the value of increasing the daily intake of available energy (MJ/d) such that it reduces the time taken for broiler chickens to reach market weight has been estimated to save \$0.04/bird through lower feed, labour, building costs and reduced mortality. This saving translates to \$2million/year for a 1 million bird/week operation or \$40million/year for the Australian broiler industry.

Figure 1. Available energy content (MJ/kg DM) of 40 individual grain samples fed to different animal types. Circled grains illustrate the range in responses across animal types



Further investigation into NIR calibrations for predicting available energy content of individual grain samples will enable greater efficiency within the feed grains and livestock industries, allowing better matching of specific grain products to livestock types.

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GRDC project: Project JLB2

Managing insects in grain sorghum – IPM

“Long term profit will be ahead if growers and advisers plan ahead for insect management in sorghum. Forward planning an Integrated Pest Management (IPM) approach can help minimise use of broad-spectrum insecticides and capture the benefits of natural beneficial insect activity in crop, rather than reacting to problems after they arise” said Dr Adam Hardy, Senior Entomologist at QDPI&F Toowoomba.

Pre planting

Soil insect pests such as wireworms, crickets and earwigs may be present in high enough numbers to affect seedling establishment. Dr Hardy said “seed treatments are now commonly available in sorghum and may be the most effective control as well as the least disruptive to beneficial insects.”

Sorghum midge (*Stenodiplosis sorghicola*) is best managed by planting resistant varieties. Early planted crops with moderate midge ratings (3-5) are unlikely to record economic damage. However any crop likely to flower 2-4 weeks after neighbouring crops may be at greater risk. “By using a high midge resistant variety later in the season, you’re not only protecting that crop but also subsequent crops by reducing midge build up,” said Dr Hardy.

Aphids and Rutherglen bugs prefer compact or closed panicle types. Added to the difficulty of achieving spray penetration on a closed head variety, choosing open headed type sorghum hybrids is wise.

Planting to flowering

Few insects commonly cause economic damage during the vegetative growth stages. The corn aphid is the most common, however beneficial insects such as hoverflies, ladybirds, and wasp parasites control them and will move from crop to crop, provided broad spectrum insecticides are not used. A good rainfall event is usually more effective than any chemical application.

Flowering to harvest

Daily monitoring from head emergence through to early grain fill is needed. At this stage the crop is most at risk to economic damage by two major insect pests; corn earworm (*Helicoverpa armigera*) and the sorghum midge (*Stenodiplosis sorghicola*).

Helicoverpa eggs are commonly laid at head emergence. Using the non-disruptive biological virus spray *Helicoverpa nucleopolyhedrovirus* (NPV) to control *Helicoverpa*, helps beneficial insects such as *Trichogramma* wasps and *Microplitis* to survive and to maintain a natural suppression of pest insects. *Trichogramma* are tiny wasps that can parasitise 60-100% of *Helicoverpa* eggs. *Microplitis* prefers to parasitise late first and second instar *Helicoverpa* larvae, often achieving parasitism levels of 30-50%.

Early application of NPV is often better, as high levels of secondary NPV infection has been recorded.

It is critical that most larvae are 7-13mm or less when spraying NPV so regular monitoring is very important from flowering onwards. New data shows using NPV is harmless to humans and beneficials but kills *Helicoverpa* larvae.

How much economic damage does *Helicoverpa* cause? New data shows that one larvae can consume 2.4g of grain in its lifetime if not controlled. One larvae per meter is thus about 24 kg of grain / ha.

Sorghum midge attacks just prior to and during flowering. Hybrids with an 8+ rating do not sustain significant yield loss under midge pressures of 10-20 sorghum midge per day. However these thresholds are reduced by many times in 1-7 rated hybrids. By choosing a variety with as high a rating as possible, growers can often avoid the need for highly disruptive synthetic pyrethroids (SP’s). While the SP’s are relatively cheap to use, they can wind up costing more over time as they kill all the beneficial insects – leading to flares in the *Helicoverpa* and aphid populations” said Dr Hardy.

Aphid and Rutherglen bug are becoming more common pests during late grain fill, but rarely cause direct yield loss. Aphids can however cause problems with honeydew problems and sticky grain at harvest. Rain or overhead irrigation is the best cure for reducing their sticky exudates. High densities of Rutherglen bug crushed in headers can also cause harvest problems. One well timed spray on populations that reach 20-30 insects per panicle will ensure that population outbreaks do not occur.

“Overall sorghum crops may be profitably grown in most seasons without the use of insecticides. Under this situation growers may be able to consistently grow sorghum crops that are both good for the environment and beneficial to surrounding crops as beneficial insects move into neighbouring fields”, says Dr Hardy.

Possibly the most important thing to consider this year is the effect the high price of grain may have on calculating economic action thresholds for insect control. At \$300 or \$400/tonne much lower insect pressures will cause greater dollar losses. Dr Hardy suggests, “growers should have an economic threshold calculated in advance that incorporates economic and IPM benefits and then monitor crops very closely, particularly during head emergence and flowering.”

For more information:

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GRDC Code: DAQ00062

Want to become a GRDC regional panel member

“Being a panel member of GRDC is both challenging and rewarding. The challenges are to identify the most important issues facing growers in the short and longer term and to set up effective programs to address these needs. This takes me to many different farming areas across the region. I also get to meet many keen and capable researchers and other service providers. It is a big commitment, but definitely worthwhile.” (Allan Mayfield, Agricultural consultant and Southern Panel Member).

Across Australia there are three Grains Research and Development Corporation (GRDC) Regional Panels representing the principal cropping zones — northern, southern and western regions. The Panels work with GRDC Management to develop the research and development portfolio. Panel members provide a ‘face’ to the GRDC representing the corporation and promoting its regional investments, while their experience provides the Board with a valuable network to draw out local, regional and national grains industry issues. The GRDC Board considers the appointment of members to the Regional Panels as crucial to the GRDC’s success.

Who are we looking for?

We are looking for grain growers, researchers, farm advisers, consultants and other industry professionals. Candidates are to demonstrate:

- Experience in liaising and working with grain growers
- Involvement in grains industry related R&D and the application and adoption of new technology and practices
- Extensive industry networks
- An understanding of the grains industry business environment, issues and challenges
- Good communication and language skills (verbal and written)
- Ability to work effectively in teams and groups.

Panel members commit approximately 40 days per year to GRDC panel activities for which they are remunerated.

Appointments are for a three year term, commencing 1 July 2008. The closing date for applications is 7 March 2008.

For a copy of the position description and details on how to apply visit the GRDC’s website www.grdc.com.au/vacancies after February 18th, or contact:

Julia Polkinghorne, Panel Coordinator
Phone: 02 6166 4500

Diary Dates

Trangie NSW (DPI Research Station)
Tue 26 Feb 08 (Growers)

Dubbo NSW (Dubbo RSL)
Wed & Thu 27 & 28 Feb 08 (Advisers)

Coonamble NSW (Bowling Club)
Fri 29 Feb 08 (Growers)

Meandarra Qld (Bowling Club)
Tue 4 Mar 08 (Growers)

Goondiwindi Qld (Goondiwindi Community Centre)
Wed & Thu 5 & 6 Mar 08 (Advisers)

Roma Qld (Club Hotel)
Friday 7 Mar 08 (Growers)

Full agendas for Northern Region Updates can be found at: www.icanrural.com.au

A more detailed list of diary dates can be found at: www.grdc.com.au

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