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NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Understanding How to use Protein Supplements

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In almost all Australian grazing systems, parts of the year are characterised by significant feed gaps. These periods may be defined as a gap where pasture growth is low to minimal; or the gap may actually be a result of declining feed quality. In this second description, declining feed quality is often associated with large amounts of dead standing feed.

The common impact of limited feed availability or in a decline of quality is a reduction in cattle feed intake and therefore a resulting loss in cattle performance.

Providing a supplementary feed ration is a common reaction by most graziers when their cattle are impacted on by feed gaps, often when cattle lose weight or condition. While deciding to supplementary feed can be a reasonably straightforward decision; implementing an effective and efficient feeding program is often more challenging.

Lack of Pasture Mass

Livestock performance is largely driven by the intake of energy. In grazing programs, this intake is limited by the availability or amount of pasture in front of the animal. To achieve optimum performance, the amount of pasture for cattle should be between 1400kg/DM /Ha and 2800kg/DM /Ha.

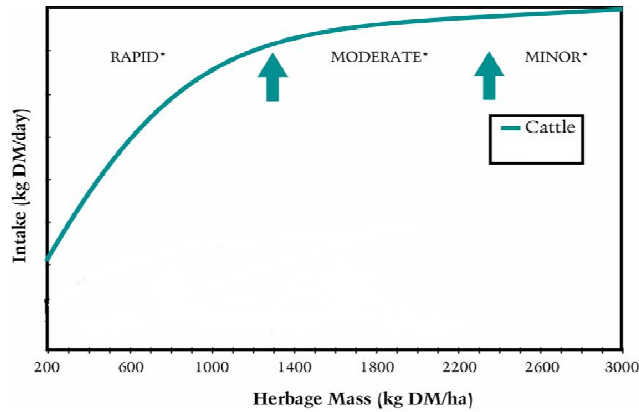


Table 1: Livestock intake is driven by the availability of pasture (Source: PROGRAZE Manual – NSW DPI)

Depending on the class and weight of stock being grazed, the minimum amount of pasture may actually be more than 1400kg/DM/ha. For example lactating cows have a high energy requirement and so require more pasture to meet their daily maintenance needs.

Matching livestock class and pasture is a daily undertaking for graziers. It isn't until pasture becomes limiting creating a feed gap that there may be a need to add a supplement.

Feed gaps created by low pasture availability are generally addressed through provision of supplements which contain energy and roughage. Common choices include good quality hay, silage, or grains.

Lack of Pasture Quality

An animal's daily intake of energy is also dependant on the quality of the feed it can consume. Just having a sufficient amount of pasture will not guarantee animal performance. The pasture the animals graze needs to have a certain level of feed quality of production goals can be met.

The quality of a pasture is directly related to its level of digestibility. At a paddock level, graziers can assess the quality of the feed by looking at the stage of growth of the pasture plants. Early vegetative plants, with green leaf are more highly digestible and are higher in energy. As a plant matures it becomes less digestible and its energy levels fall (Diagram 1).

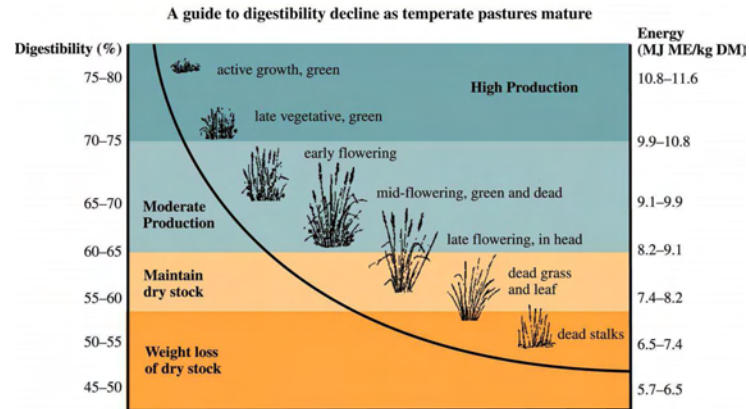


Diagram 2 – Digestibility decline as pastures mature (Source: PROGRAZE Manual – NSW DPI)

The decline of pastures below 60% digestibility results in pastures entering a quality feed gap. However many producers don't always recognise this as a feed gap, as often there is large amounts of standing feed. Making the most of this standing feed and maintaining animal performance should be the focus of a

supplementary feeding program in a feed gap caused by declining quality.

The role of Protein Supplements

In a quality feed gap, the challenge for graziers is to maximise animal intake of energy. Low digestible pastures have lower levels of Crude Protein (CP%) which is essential in keeping the rumen function efficiently.

Efficient rumen function effectively means the rumen microbes are able to digest and release the energy contained within the pasture the animal has consumed. Low digestible pastures take longer to pass through the rumen and digestive system as well as containing less energy.

Supplementing with a protein source aims to increase the efficiency of the rumen in digesting these low quality pastures. Strategic use of supplements can increase animal intake of pasture or increase the rate of digestion resulting in a better use of standing feed.

However, there is a limit to how much a producer can achieve with the use of protein supplementation. There has to be sufficient quantity of plant material for the animal to eat more. If is not there then protein supplementation is not achieving its purpose of increased intake. At 2,000 kg DM/ha herbage mass is considered to be getting towards the lower limits for cattle production.

Its important for graziers to recognise when pasture mass falls below 2,000kg /DM / Ha or when the pasture quality falls below 50% digestibility.

By this stage using a protein supplement is an inefficient exercise. Below 50% digestibility the plant material has little nutritional value although has a physical value for rumen function.

In practical terms this means there are limits to what protein supplements a grazier should use. More importantly it's vital to recognise that once theta limit is approaching, graziers have to plan to switch to a more appropriate supplement (Table 1)

Table 1: Window of Usefulness for Protein Supplements by Herbage Mass (D.M)

Protein Source	'Plentiful' over 2,500 kg/ha	'Reducing' 2,500 – 1,500 kg/ha	'Low' 1,500 – 800* kg/ha
Blocks	√√√	√√	N.S.
Roller drum	√√√	√√	N.S.
Protein meals	√√√	√√√	√
Manufactured protein pellets	√√√	√√√	√
Lupins	√√√	√√√	√
White Cotton Seed	√√√	√√√	√

- √√√ Within window
- √√ The window is closing, make your next decision now.
- √ The window is all but closed, move to supplying energy.
- N.S. The window is closed, move to supplying energy not protein.
- * Below 800 kg DM/ha destock the paddock.

As part of this plan, graziers should also recognise that their plan may result in either a destocking (if the feed gap is likely to extend) or to be prepared to move towards a feeding

program based on energy and roughage (as discussed previously).

During a feed gap, graziers should be thinking of the most effective methods to “top-up” their pasture shortfall, with either protein or moving onto an energy rich feed. However good planning must take into account the risk associated with a feed gap extending into a drought. Drought management strategies are very different to the use of supplements in a feed gap.

Common mistakes with protein supplements

The most common mistake producers make when choosing to use protein supplements in a feed quality gap is to extend their use beyond the window of usefulness. For example a supplement such as a roller drum mix may be very appropriate with a large amount of standing feed. However as that feed availability also declines, the roller drum mix becomes less effective.

To avoid this type of mistake, it is important to recognise there is an associative effect created by feeding protein supplements. That is, the correct use of protein supplements will increase pasture intake. The livestock will eat more pasture and this will result both less pasture and as a consequence in producers having to change the supplements or make other decisions such as altering stocking rates.

The other common mistake is to expect high levels of animal performance, particularly weight gain

from protein supplementation. The reality of protein supplementation is to maintain animal liveweight. Slight weight gains are often associated with protein supplements, but in general the aim is to maintain animals.

Options for supplementary feeding

The broad categories of protein supplements producers should consider are online in Table 1. However more detailed descriptions of supplements and rates of feeding are well published. A collection of relevant publications are available at: the NSW DPI and is found on the web site under beef cattle nutrition.

<http://www.dpi.nsw.gov.au/agriculture/livestock/beef/feed>

Conclusion

Forward planning and good pasture assessment skills will contribute to developing more effective and efficient supplementary feeding programs. Recognising the usefulness of feed options can help producer's better match supplements to pastures and maintain their livestock more effectively throughout identified feed gaps. If there is doubt regarding the choice of supplements producers should speak to their DPI independent advisors so they can make the most effective and efficient feeding choices.

Understanding & Using Fat Scores in Your Beef Herd

Alastair Rayner
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How fat your animals are influences many areas of your beef business. Being able to assess just how fat an animal is can improve breeding herd efficiency, assist with management decisions such as stocking rates and can improve the value of sale stock which meet market requirements.

What is a fat score?

Fat scores are objective descriptors based on the amount of subcutaneous fat an animal has. It is possible to measure fatness on a live animal. This is done through the use of an ultra sound scanner. While ultra sound scanning provides an accurate measurement, it isn't always possible or practical to carry out in commercial herds.

Fat scores, which are based on fat depths, provide a practical, accurate and efficient method for producers to determine fatness across any class of livestock.

Fat scores range from a Fat Score 1, through to a Fat Score 6. Fat score 1 are animals with minimal fat depths, through to Fat Score 6 where an animal is extremely fat. Table 1, identifies the levels of fatness at both the P8 (rump) site and on an animals long ribs, for each fat score.

Fat Score	1	2	3	4	5	6
P8 (mm)	0-2 mm	3-6 mm	7-12 mm	13-22 mm	23-32 mm	33+mm
Fat (mm)	0-1 mm	2-3 mm	4-7 mm	4-7 mm	3-18 mm	19+ mm

Table 1: Fat score of cattle and mm of fatness at the P8 & Rib

Fat scoring livestock

Fat scores can be applied to cattle through visual assessment, or by manually assessing animals when they are safely restrained in a race or crush. Occasionally visual assessments may be confirmed or adjusted by a manual assessment.

What to look for?

As an animal fattens its physical appearance undergoes dramatic changes. Knowing what to look for, and where to look, is essential to accurately fat scoring cattle. The three main areas to visual observe these changes are the animal's brisket, flank and tail head.

As an animal gets fatter, the major bones become much less visible. The sharp angularity of the ribs, hips and pin bones firstly becomes softened by the layers of fat, and as fatness increases, becomes barely visible.

The brisket, flank and cod of the animal become smoother and give the appearance of the animal being a much squarer shape. When looking along the top line of the animal, as it gets fatter it becomes more rounded. With the increase of fatness, knobs of fat appear either side of the tail head and gradually these knobs will join to be one layer over the tail head. Fat deposits in the brisket cause the brisket to become wider and fuller.

So what do the different fat scores look like?

Determining the difference between fat scores relies on looking at the changes in the three key indicator sites of the brisket, flank and tail head. Occasionally it will help to look at other sites on the animals. These other sites are the ribs and hips of the animal.

The characteristics of each fat score are outlined in Table 2.

Description	Fat Score
Major bones including ribs, shoulder blade, hip and pin bones well defined and easily seen. Individual spinal bones can be seen Brisket appears as lose skin, and the flank area appears sharply defined	1 (0 – 2mm P8; 0 - 1 mm 12 th rib)
Ribs no longer visually obvious. No fat knobs beside tail head. Brisket appears to have some filling, but largely lose skin, flank is still sharply defined If felt manually, spines feel rounded rather than sharp	2 (3 – 6mm P8; 2 – 3mm 12 th rib)
Distinct fat knobs on either side of the tail head. Ribs cannot be seen visually. Muscle seems on the hind quarters no longer	3 (7 – 12mm P8; 4 – 7mm 12 th rib)

visible. Smoothness in the cod. Brisket filling out, becoming wider and fuller. The flank also becoming smoother and lower on the animals body If felt manually, ribs can be felt with firm pressure, and the short ribs can be felt and should feel rounded	
Fat over the tail head in one smooth layer. Hip bone can be noticed, but as a very smooth and rounded. Brisket wider and fuller with very little lose skin. Flank almost level with the underline of the animal. If manually assessing it may be difficult to feel the short ribs or the individual long ribs.	4 (13 – 22mm P8; 8 – 12mm 12 th rib)
Animals appear almost rectangular when looking side on. The brisket wide and full, the flank level and smooth with the underline of the animal’s body. Waves of fat may be visible across the hind quarters of the animal looking	5 (23 – 32 mm P8; 13 – 188mm 12 th rib)

almost like a pair of baggy pants. Manual assessment may have difficulty in feeling long or short ribs or even hip or pin bones.	
Tail head, hips and lower hindquarters have obvious waves of fat. Animal walks rather than moves freely. Heavy brisket, flank and udder.	6 32 + mm P8; 18+ mm 12 th rib

With practice, visually inspecting the key sites allows producers to quickly decide on the fat scores of a mob of cattle. A great advantage of visually assessing fat scores at these indicator sites is that they apply to any class of stock from bulls, cows through to maiden heifers.

Manual assessment is best done in a race or crush. Again the important assessment sites are those which the producer knows they are feeling fat and not muscle. In manual assessment, the sites to feel fatness are over the long ribs, the short ribs, the hip and pin bones. At each of these sites, what is felt under the skin is the fat depth over prominent bones. It is dangerous to try and grab the brisket or flank and should never be attempted!

Using fat scores for production

There are many practical applications for the use of fat scores in the management of beef enterprises. These include selecting sale stock which meet market specifications for fatness and to manage breeding females and bulls.

Market Specifications

The markets for beef cattle are well defined by weight and fat. These definitions are more commonly known as specifications. Failure to meet specifications often results in a financial discount. Specifications are set by both feedlots and abattoirs. The range of fatness is specified in mm.

Using fat scores, producers can more accurately select cattle which will meet their chosen market's specifications. Meeting the fatness specifications can help avoid a discount and increase overall business profitability.

Managing the Breeding herd

A major goal of cattle production is for all breeding females to produce a calf every 12 months. This can be more of a challenge than it sounds. The gestation length of cattle is about 282 days. Cows with a fat score 3 at calving should return to oestrus around 55 days after calving. This allows about two heat cycles if the producer's goal of a 12 month calving period is to be achieved.

Cows which are in a Fat score 2 or lower will take much longer to return to oestrus. Depending on the fat score, return to oestrus may be delayed by three weeks. The end result is less chance of cows going into calf every twelve months.

At a practical level having cows in a lower fat score may mean a later and longer calving period. This results in a bigger spread of calves of different

ages and weights. The flow on effect is to produce a group of cattle which will be harder to turn off to meet specific market specifications and therefore increasing the risk of suffering a price discount at sale time.

In controlled time joining, cows which fail to go into calf are culled from the herd at pregnancy testing. The financial implications of replacing these cows can be a real issue for producers. Often these costs may have been avoided if greater attention had been given to fat scores in the lead up to calving.

Why is fat so important to breeding cows?

Fat is essentially the body's way of storing excess energy. When energy intake falls below the body's requirements, fat reserves can be drawn on to make up the deficit.

Cow's energy requirements effectively double once the calf is born. It takes a lot of energy to produce milk for a calf as well as to maintain the cow. Often a cow cannot physically eat enough to meet this increased energy demand. By drawing on fat reserves the cow can make sufficient milk for her calf and meet her own physical requirements.

The cow's return to oestrus is driven by hormones which are released when there is sufficient energy.

In practical terms, low fat scores mean a cow has less energy to draw on to meet the demands of producing milk or to trigger hormones which drive oestrus. The result is to produce less milk, resulting in lighter calves and to delay the return to oestrus until energy demands are satisfied.

What are the options for managers?

Fat scoring a breeding herd can allow producers to make management decisions

about for their cows before it is too late. For example cows can be drafted into groups based on fat score. Lower fat score cows can be placed on better pastures or feed appropriate supplements.

Or recognising that cows are below the average at calving may help producers plan improved feeding programs to lift the intake of energy and so ensure milk production and a quick return to oestrus.

Managing bulls

The amount of fat carried by bulls can have a significant effect on his fertility and on the joining rates within his mating groups. To maintain high reproduction rates, bulls need to produce high quality semen and have good libido.

Fat initially tends to be deposited in parts of the animal where there is loose skin and very little muscle. This is why the filling of the brisket and flanks are such good indicators to visually assess fatness. In bulls, fat can also be laid down around the testicles and in the scrotum.

Fat acts as an insulator, and when it surrounds the testicles it is more difficult for temperature to be kept at the optimum level for healthy sperm production. Therefore fatter bulls will be less fertile.

Fatter bulls also tend to be lazier. Laziness inhibits the bull's libido. The practical point is that a fat bull will be less likely to search out and mate with cows, and if he does mate he may be inseminating with semen which is not

as fertile as needed for high conception rates.

Ideally bulls should be managed to stay within the range of Fat score 3. More than a Fat score 3 and the bull's fertility and libido may be compromised. At the other end of the scale, bulls in a lower fat score may also have their libido and semen production compromised.

The work load of a bull during a mating period is extremely high. The energy required seeking out and mating with a large number of cows may mean the bull will draw on body reserves to meet the increased demand. Having sufficient body reserves ensure the bulls is able to meet the demands for a joining period. Low Fat scores may mean the bull runs out of energy and reduces his work load, reducing the overall reproduction rate in the herd.

Conclusion

Visual and manual assessment of fat scores is both a practical and cheap method for producers to drastically improve herd management and improve herd productivity and profitability. By practising fat assessment on various classes of cattle producers can improve accuracy and confidence.

Advice on fat assessment as well as training in the application of fat scores is available through courses such as Prograze, and through field days conducted by Department of Primary Industries Beef Cattle Officers in most states.

Look after your non working bulls

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For most beef producers, February is a fairly quiet time on the annual production calendar. With joining completed many producers should bring their bulls out of the cow herds and place them back into the bull paddocks for a spell.

While there is no doubt that after twelve weeks joining, bulls do need a chance to rest and regain condition; producers should plan this period carefully as a number of things can go wrong. The post joining period is often characterised by injuries and severe stress on bulls.

As with all cattle, bulls kept in groups, quickly develop a “pecking order”. Sorting out the order in a group of bulls can be quite painful for bulls, particularly for those smaller, younger and weaker animals.

After joining, when bulls are brought together into a group, the order of the group needs to be re-established. Bulls will attempt to assert their strength and position within the group, and this process can take up to a week.

Producers who recognise this can plan ahead and reduce some of the stress and potential for injury to their bulls. The most effective strategies include, giving smaller, lower conditioned bulls a chance to rest and regain some strength on their own, before introducing them to the bull group. If it is possible, bulls should be kept in groups of similar age, size and weight. If that isn't possible, keeping bulls in large paddocks where the smaller, younger bulls have plenty

of room to get away from the more dominant bulls is a sound option.

It's important during the first few weeks that producers keep a close eye on their bulls. While it is impossible to prevent them fighting and sorting out the order in their group, it is important that weaker animals are protected from constant harassment by removing them, from the group until they recover their strength and condition.

By planning this period and closely watching their bulls, producers can minimise potential injuries to their animals and ensure the start regaining their condition for the next joining period.

Using Carcase Competitions to Improve Your Beef Operation

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Measuring your performance as a beef producer is essential to monitor the direction and profitability of your enterprise. Long before the term benchmarking became part of industry jargon, beef producers would compare their animals against their peers and against breed standards through agricultural shows & competitions.

Carcase competitions have been part of agricultural shows & competitions for many years. These competitions offer producers an opportunity to learn many things about their beef production systems. Producers have used carcase competitions to compare sire lines; finishing systems or to better understand meat yield or meat quality.

In NSW carcase competitions are assessed under a system known as the Australian Beef Carcase Appraisal Method (ABCAM). ABCAM was developed during the late 1970's and early 1980's by Russell Lucock of the Australian Meat and Livestock Corporation (AMLC). ABCAM had its origins in the Beef Appraisal Method (System) known as ABCAS. After Russell Lucock left the AMLC, NSW Agriculture took on ABCAM, ensuring it remained at the forefront of industry.

The basis of the ABCAM system is to award points to an individual carcase across a number of different traits, which are grouped under three categories. These three categories are Market Specifications; Saleable Meat Yield & Eating Quality. These three categories have been the corner stones of the ABCAM system since its inception.

However as meat science and market specifications have evolved, the individual traits within the categories have also evolved, reflecting the industry standards. The current version of ABCAM utilises the key meat quality assessments of carcase pH; Weight for Maturity; Marbling, Bos Indicus Content and carcase fatness. These areas represent the critical areas of influence on eating quality.

While there are many other contributors to eating quality, the scores of carcasses in these traits can indicate to producers if there are issues they should consider addressing before dispatching their cattle to a processor.

Points are allocated to individual traits within the three categories. The allocations are listed in the following table.

Category	Trait	Points
Market Specification 15 points	P8 Fat Depth	10
	Fat Colour	5
Saleable Meat Yield 40 points	Muscle Score	10
	Eye Muscle Area	15
		15
	Rib Fat Depth	
Eating Quality 45 points	Ultimate meat pH	10
	Meat Colour	5
	Weight for Maturity (Ossification)	10
	Bos indicus Content	5
	AUS-MEAT Marbling	5
	Fat Distribution	10
	Total points	100

During judging, each carcass is assessed and allocated points for each trait. The points are based on a market category. Maximum points are awarded for those carcasses which meet specifications for that market. The further from specification the carcass is, the lower the number of points that are awarded.

Market specifications are used to set the fatness specifications.

When carcasses are assessed for meat yield, they are assessed in two ways. The first is to measure the Eye Muscle Area (EMA). The EMA is measured using a transparent plastic sheet, with printed gridlines. Each square of the grid is 1cm². However the size in square centimetres alone does not determine the points. EMA relative to the carcass weight is used to determine the points the carcass will score for this trait.

Lighter carcasses with a larger EMA will score higher points than that of a similar weight carcass with a smaller EMA. Conversely two carcasses may have the same EMA, but receive different points for this trait. The higher scoring carcass will be the lighter one.

EMA points are not the only ones which use a combination of measured trait and carcass weight. The allocation of weight for maturity points also allocated points in this way. Ossification is assessed using the MSA standard assessments, which are recorded in tens, starting at 100. The Ossification score and the carcass weight combine to determine the score for this trait. In practical terms, if two carcasses are assessed the same for ossification, the carcass with the heavier weight will score more highly than the other.

Muscle score is used to allocate the other yield points of a carcass. Muscle score and not butt shape is used in ABCAM. Butt shape only identifies a one dimensional profile of

the butt. Muscle score is a complete assessment of the entire muscle volume of the carcass. It is also a score which can be given to a live animal as well as to a carcass.

Fat colour, meat colour, pH, marbling and ossification are all assessed by an MSA or an AUS-Meat accredited assessor where available. These assessments are the same as those used commercially every day and provide a producer with a direct link between a carcass competition and the commercial world.

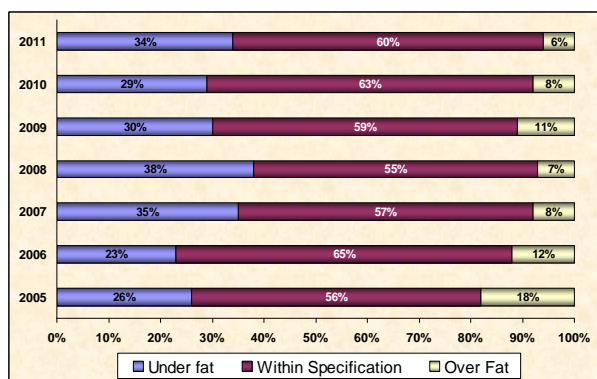
So what makes an ideal carcass?

The answer to that question applies to both competitions and to the commercial environment. Carcasses which show high growth for age, meet the specifications for fatness, are high yielding (C+ muscle score or better); meet the eating quality requirements for pH and display some marbling are ideal.

While this may be the ideal, many carcasses often don't meet these requirements, either in a competition, or when sold as part of a commercial turn off. The most common areas where carcasses fail to score in carcass competitions is in the area of fat specifications, followed by low scores for meat quality due to a high meat pH or dark coloured meat.

The ABCAM system has been used for the past 20 years to judge the carcass competition conducted during the Sydney Royal Easter Show. Over the past 7 years, the compliance with P8 fatness specifications have been recorded. As can be seen in Table 2;

close to 30% of cattle are under fat for the market specifications they have been consigned to.



So what does this graph really mean?

Competitors would appear to be not assessing the growth rate of their cattle correctly, and are either growing their animals too slowly, or starting their finishing programs later than they should to prepare cattle for the market.

In commercial terms, these under fat cattle are likely to be discounted on a cents per kilogram basis. The size of this discount can be very significant, particularly for lower fat levels. The lesson this carcass competition should provide to many producers is to know their market specifications, and to assess their cattle fatness more closely before dispatching them.

Traps & Pitfalls

Carcass competitions, particularly those judged under ABCAM provide comprehensive feedback for producers. Unfortunately, many producers look at only one or two traits when they get their feedback. Often this focus is along the lines of trying to achieve an extra point or two in one particular trait.

While feedback can be used to adjust a program to improve traits such as muscling, yield or meat quality, many producers overlook some fundamental basics. In

ABCAM a quarter of the total points on offer (25 points) are allocated to meeting specifications for fatness. This reflects the importance of fat specifications to the industry. A further 10 points are then allocated to the distribution of fatness across a carcass. There are five points for fat coverage on all the major primal cuts, and five points to ensure an even fat distribution across the carcass.

Fat cover on the primal cuts is important to ensure even chilling and insulation while the carcass is in the chiller. While evenly distributed fat reduces the level of trimming and preparation that is required when the carcass is fabricated into retail cuts.

All up 35 points out of 100 are directly related to fatness in carcass competitions. Producers who understand this, assess their cattle regularly and adjust growth rates to ensure their cattle meet the specifications of a competition or a processor on the given day.

Carcass yield accounts for another 25 points. Selection for muscling is something all producers should undertake. Selecting heavier muscled bulls and retaining heavier muscled females will result in improving the herd's level of muscling. Not only will carcass scores improve, but these animals are worth more money when sold through the saleyards or direct to a processor. Research by NSW DPI has identified an average 15c/kg advantage per muscle score across all grades of cattle sold in NSW.

Carcass competitions can provide a benchmark for a producer's level of

muscling. Producers seeking to capture the increased value associated with muscle score can draw on their competition feedback to guide their selection decisions.

Conclusion

Carcase competitions are not the only method available to producers to benchmark their herd's performance. There are many ways to assess, compare and evaluate a beef enterprise. Carcase competitions provide one level of feedback which should be viewed along with normal abattoir feedback to gain an overall picture. Carcase competitions which offer feedback, such as those judged under ABCAM can offer insights which can lead to improvements in a producer's selection, or management decisions.