NSW GOVERNMENT | Department of Primary Industries

Pulse Quality in relation to the Standards

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BSI

Quality ISO 9001
Certified Laboratories

Our grain quality expertise spans across the whole industry value chain

Pre-Breeding Research

- Method development
- New technologies
- Genetic tools

Breeding

- Evaluating lines
- New variety traits and classification
- Phenotyping populations

Agronomy/ Physiology Effects on Grain Quality

- GxExM
- Weather events
- District and regional trials

What can farmers do to maximise price?

Harvest Issues

At The Farm Gate

Grain classification

Price

- Storage
- Shelf life stability

Market Access

- Exports
- Domestic markets
- Increasing diversification

Food Science

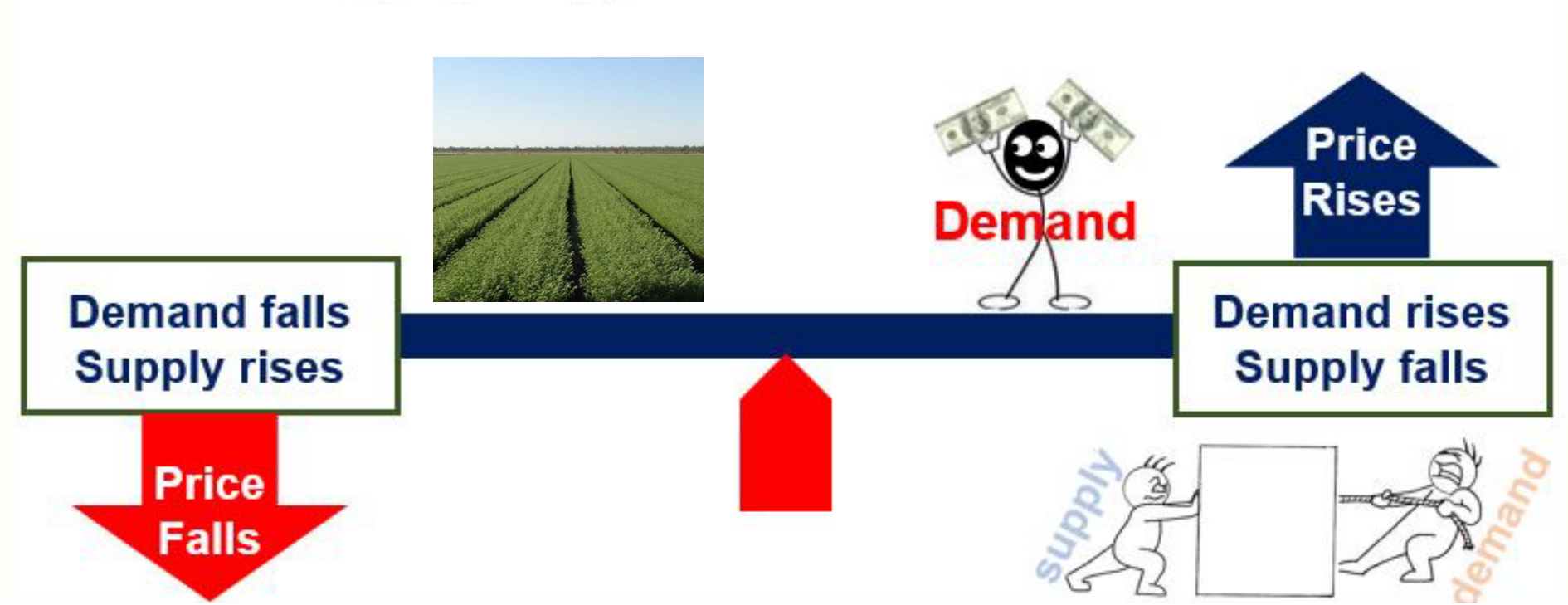
- Variety perfromance
- Food as medicine
- Processing performance
- Sensory evaluation
- Consumer preference (demand)

Economics

- Grower profitability
- Value chain

GRAIN QUALITY GROUP RESEARCH AND DEVELOPMENT

Price – The Supply and Demand Balance



DEMAND is ultimately driven by consumers

SUPPLY is controlled by (grower decisions x environment) x all countries

Demand – what do consumers want?

Grain needs to be attractive, safe and perform as expected!

Market access. Australia needs to maintain high quality and preferred buyer status.

We do not want to compete on price, so we must compete through better quality.

Our buyers will pay higher prices for high quality pulses that are demanded by certain consumers and processors.

Pulse Quality Evaluation

What does classification infer about the quality?

Low moisture → Less chance of spoilage

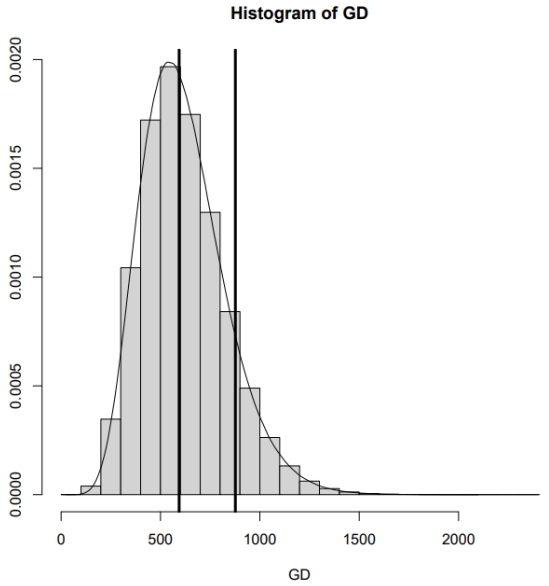
Uniform colour → visually attractive

→ an indicator of favourable and even growing conditions and thus an indicator of expected performance in foods

Uniform size → dehulling/splitting efficiency

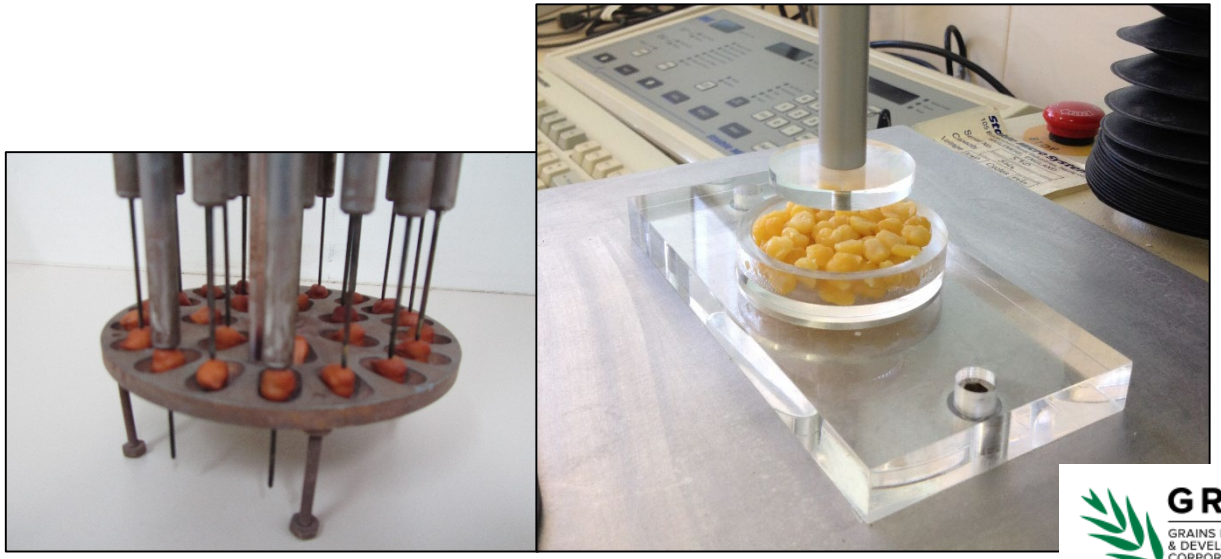
→ consistent cooking times

Large sizes → less waste during processing



Additional attributes are evaluated in the breeding programs:

- Milling performance
- Cooking times
- Processing performance



Department of Primary Industries

CHICKPEA SURVEY

Did you have problems delivering your chickpeas from the 2017 harvest?

NSW DPI, in partnership with GRDC, is researching seed defects in chickpeas. Please help us understand the impact of chickpea grain defects on growers by completing this short anonymous survey.

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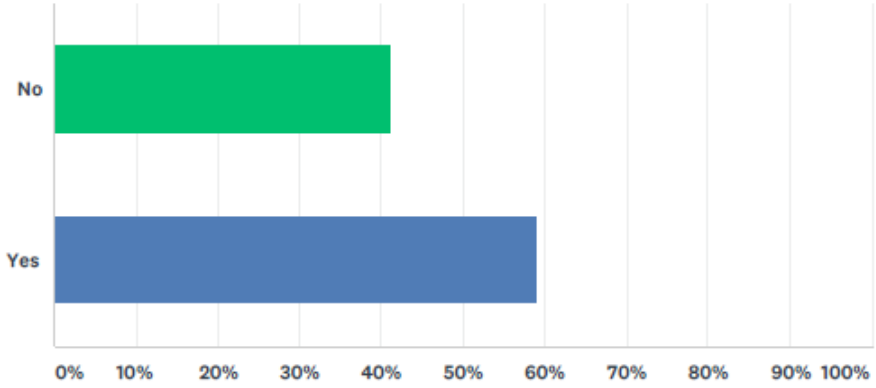
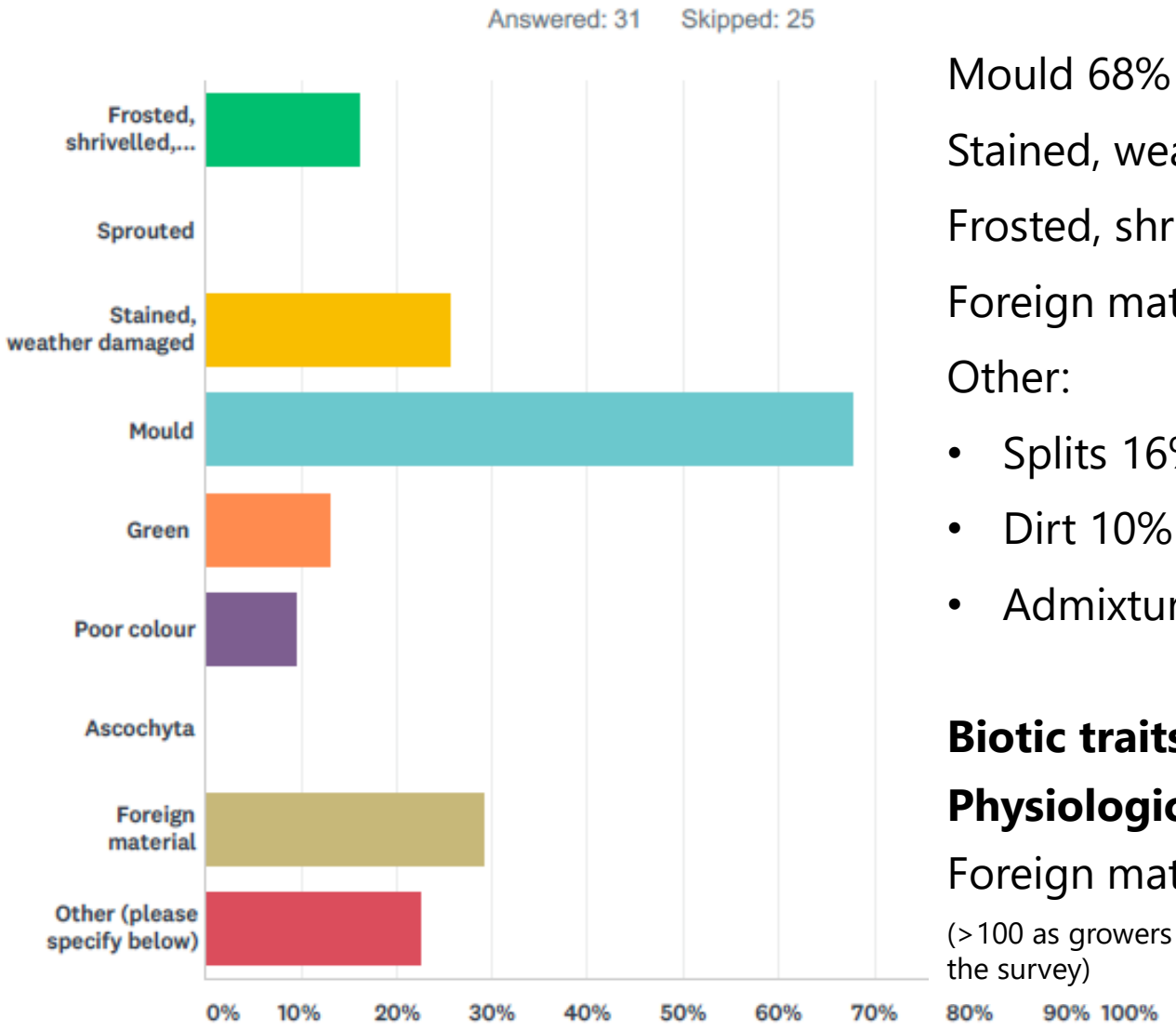
Q3 Were any of your chickpea deliveries discounted or rejected at the delivery point?

Answered: 56 Skipped: 0



Q5 What was the claimed defect?



Mould 68%

Stained, weather damaged, poor colour 39%

Frosted, shrivelled & green 29%

Foreign material 29%

Other:

- Splits 16%
- Dirt 10%
- Admixture – seed still in pods 3%

Biotic traits = 68%

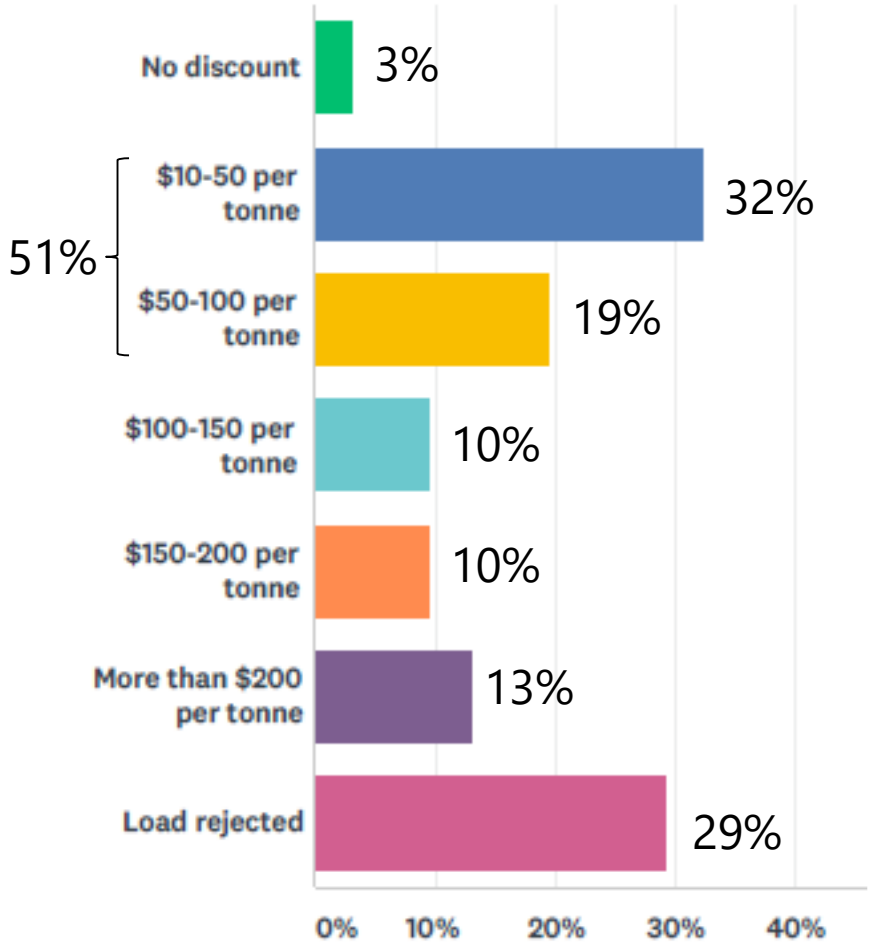
Physiological traits = 68%

Foreign material = 42%, Splits = 16%

(>100 as growers allowed to enter more than one claimed defect in the survey)

Q6 What was the discount for your grain?

Answered: 31 Skipped: 25



Additional costs due to grain defects:

- Further transport costs
- Grading & cleaning costs
- Delays to subsequent harvesting
- Holding & storage costs

CSIRO PUBLISHING
Crop & Pasture Science
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Economic impacts of chickpea grain classification: how 'seed quality is Queen' must be considered alongside 'yield is King' to provide a princely income for farmers

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Abstract. Chickpeas (*Cicer arietinum* L.) are a high value crop for farmers, but price penalties will be imposed or grain rejected whenever the standards are not met by growers whose crops suffer grain defects in a particular season. Australian chickpeas are renowned for their high quality and are generally in high demand globally because of good farming practice and strict grain quality standards. However, small quantities of defective seed in grain loads can reduce the price paid to individual farmers, with significant financial impacts. Information is scarce on the types of defects causing price penalties and there is no information on the magnitude of those penalties. An online farmer survey was conducted to capture information on the types of grain defects, price penalties imposed and load rejections with respect to the delivery of their 2017 chickpea crop. Here we show that the cost to individual chickpea farmers affected by price penalties or load rejections ranged from AU$743 to $1 293 750. Furthermore, the total cost of seed defects was calculated to be $154.2 million in that season, equating to a revenue loss of 23.7% of gross value of production in Australia. Chickpea seed defects also contributed to additional costs including seed cleaning, further transport costs and harvest delays, with subsequent risk of yield losses and further quality defects. Too often, crop yields are the focus while seed quality is overlooked as an essential driver of farmer profitability. We demonstrate how important seed quality is to farmer profitability; if 'yield is King' then seed quality is certainly Queen. We suggest that farmers prioritise harvest of their chickpea crops ahead of harvest of cereal crops to minimise the risk of chickpea seed defects and seed loss, and to maximise profits from this higher value crop. Additional surveys over several seasons are warranted to refine information on the types of seed defects occurring in chickpea and their financial impacts on farmers, and they could be expanded to other crops and countries. We suggest that misclassification of seed defects needs further exploration, as does research into minimising the major causes of seed defects. Improvements to grain classification systems globally should be sought to provide better support for farmer profitability so that they can continue to feed the world.

COST of price penalties and load rejections for the 2017 crop:

- to the Australian chickpea industry = $154.2 million

A revenue loss of 23.7% of GVP
(Gross Value of Production)

- to individual farmers ranged from $743 to $1,293,750
- PLUS additional costs

Q7 What are your priorities for future research into chickpea seed defects?

Answered: 49 Skipped: 7

Won't be growing them again due to price gouging post harvest (grading etc)
consistency in testing as one load was rejected for three different reasons and then accepted on another test as chickpea grade 1 after being sampled at a site owned by an exporter 200 kms away.Previous loads had been accepted as grade 1 at local silo,
Variety traits, tiger stripe has big impact when there is other samples with similar visual defects from other issues.
The industry needs accountability on the delivery side if incorrect identification and causing significant cost penalties to the grower.

Grain classification confusion .....

Due to higher than normal fungal disease pressure in many regions during the 2016 winter growing season, sclerotes (fungal disease survival structures) were found in some chickpea and lentil grain deliveries.

Sclerotes from Sclerotinia disease are **not harmful** to humans or livestock but can affect quality by producing darker coloured flours.

Sclerotes from a chickpea sample showing irregular types typical of *S. sclerotiorum* with the atypical cylindrical types.

Photo: Gail Chiplin NSW DPI Tamworth

Foreign material <3% (by wt.) incl. < 0.5% unmillable

Ryegrass ergot (*Claviceps purpurea*) is a less common disease that also produces sclerotes.

Claviceps sclerotes are unsafe for animals and humans due to the production of **toxic** alkaloids, which remain a problem even after processing.

Photo: Mal Ryley

Ryegrass ergot <2 cm length from 200 g

Sclerotes from these two diseases cannot be positively distinguished without the use of laboratory techniques

Disease gurus

Dr Kevin Moore (retiring)

Hayley Wilson
(Kev's understudy)

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Grain classification confusion .....

Defective
< 6% (by wt.)

Normal

Shrivelled and Wrinkled

Mould?

Severely Damaged
< 1 seed in 200 g ?

Shrivelled/wrinkled seeds can be due to either:

- late frosts, or
- small mature seeds from a hard finish
- immature seeds from late rain stimulating new growth & podding

Visual determination of mould is not always accurate

Grain classification confusion .....

Ascochyta blight on seeds

DISEASE

Defective (diseased) < 6% (by wt.)
or
Fungal Affected< 1% (by wt.) and
Poor Colour (kernel) < 2% (by wt.)

OK

Tiger stripe
seed marking

OK or Defective?

Mosaic
seed marking

OK, Defective or
Severely Damaged?

Blotch/tiger stripe
seed marking

PHYSIOLOGICAL

Hail Damage

ENVIRONMENTAL

Defective (hail damaged) < 6% (by wt.)

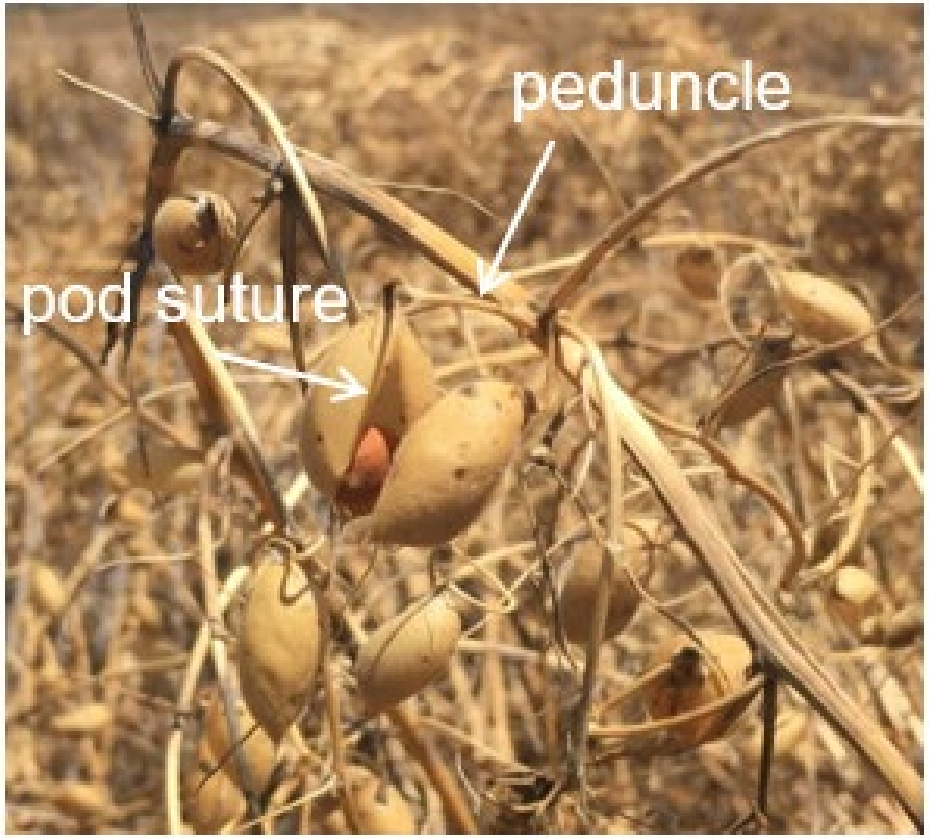
Poor Colour (kernel) < 2% (by wt.) or
Severely Damaged? (1 seed/200g)

It can be very difficult to distinguish between these blemishes visually

Immature Seeds

- Immature grain – immature seeds at harvest due to late season rains causing either:
  - prolonged plant podding, or
  - new growth on the top of physiologically mature plant resulting in a second flush of podding
- Desiccation timing in these instances is a difficult balance.
- Aim to increase the mature seed yield without:
  - too much loss & defects from weather damage (over-ripe)
  - too much defect seed from immature grains
- Immature seeds have high moisture content, so are more prone to developing mould

Harvest Issues .....



Delaying harvest can significantly reduce both yield & quality

When the plant gets too dry:

- the peduncle weakens → pod loss
- the pod wall suture can split open → seed loss
- lower moisture content → seeds weigh less

  eg. 10% moisture content = $24 less/T than 14% seed (@$600/T)
- risk of lodging → harvest reduced, pods grounded
- risk of weather damage → seed defects and price penalties due to staining, poor colour, mould, sprouting, split seeds

Do not keep weather damaged grain for planting

What can growers do to maximise the price paid?

1. SOWING: good quality treated seeds; variety choice; clean paddocks; sowing date
2. GROWING: fungicide application before first rain event; monitor for pests & diseases and treat accordingly
3. HARVEST:
   - Time of desiccation must factor in crop maturity, ensuing weather predictions and availability of harvest equipment/people
   - Harvest as soon as grain reaches 14% moisture
   - Run a test strip and adjust header settings to capture all the good quality grain and reduce capture of defective material – Failure to do this step may result in the need for grain cleaning
4. POST-HARVEST: Is seed cleaning needed?
5. SELL or STORE: Timing. Storage must be clean, hygienic (pest control), consider temperature and humidity effects

Can't control the weather, BUT CAN control your management activities

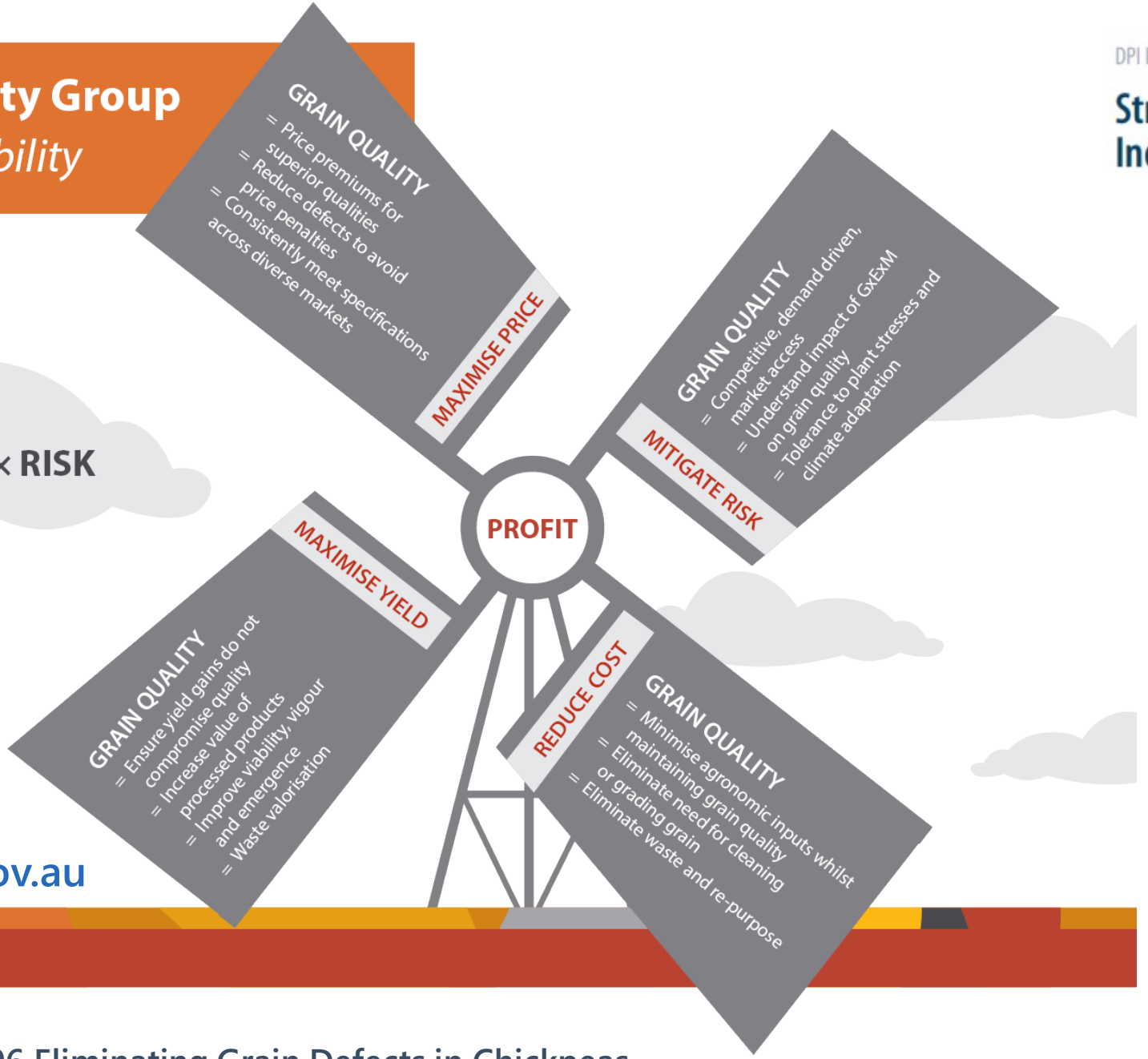
NSW DPI Grain Quality Group

Quality powers profitability

DPI PURPOSE

Stronger Primary Industries

PROFIT =
(YIELD × PRICE – COST) × RISK



Quality ISO 9001
Certified Laboratories

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DAN00196 Eliminating Grain Defects in Chickpeas

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