



Shelf-life of Australian vacuum packed beef-impact of meat colour

Food & Nutrition

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Extension of shelf-life to promote global competitiveness

Falling \$AUS, advantageous to export markets

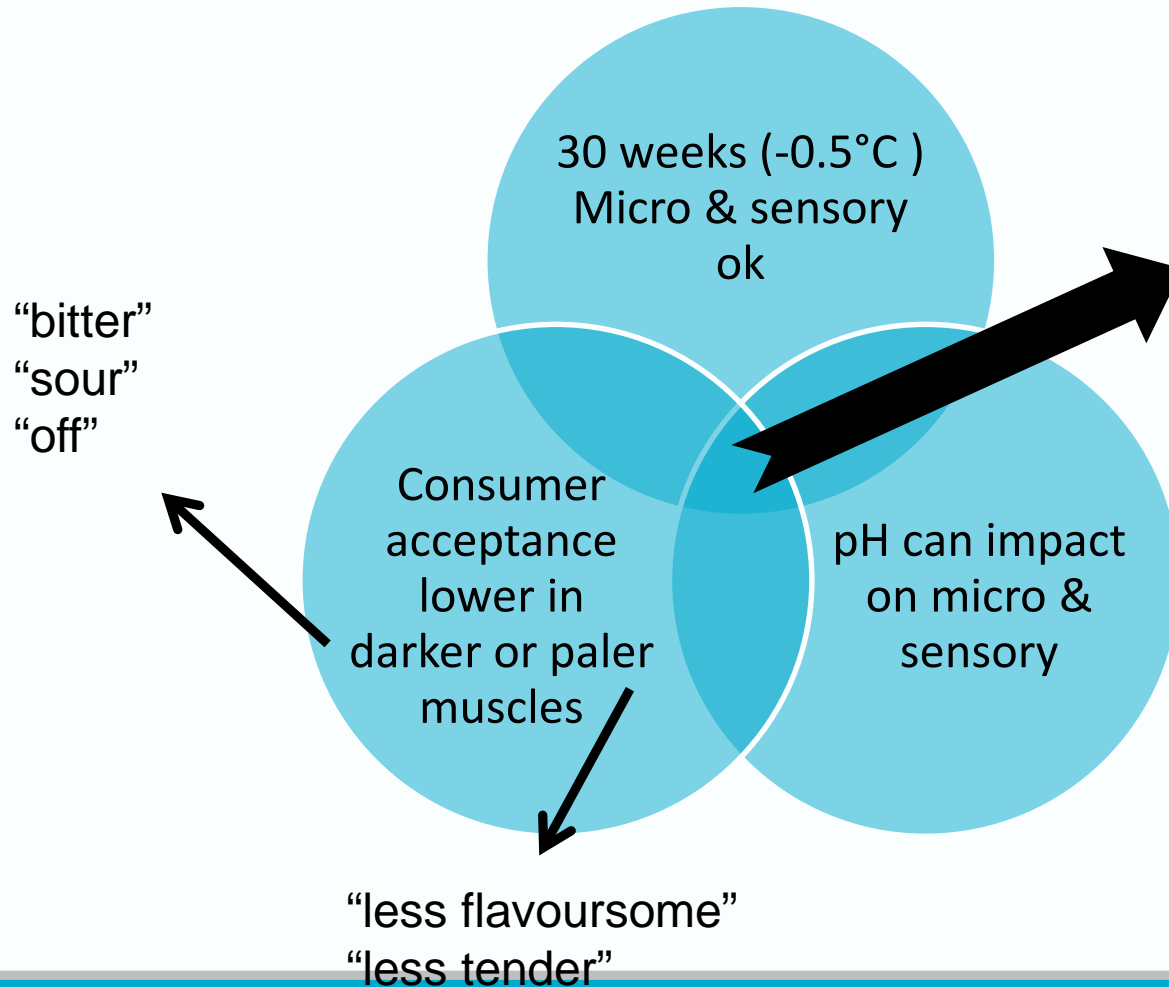
Opportunities for growth in other export markets-Free Trade Agreements (FTAs)

Increased demand for high quality Australian beef- especially with the rising Asian middle class

Enhancing our global competitiveness-differentiation in global environment



Background research



Does meat colour
impact shelf-life
& eating quality?

Long aged (20 weeks) vacuum packed chilled storage- design

3 meat colour scores

1B, 1C (light)

2, 3 (medium)

4 and above (dark)

324 striploin samples from 3 export plants (mix of pasture & grain fed animals)

Stored at -1°C for 20 weeks at CSIRO

Assessed at 0, 2, 8, 12, 16 and 20 weeks

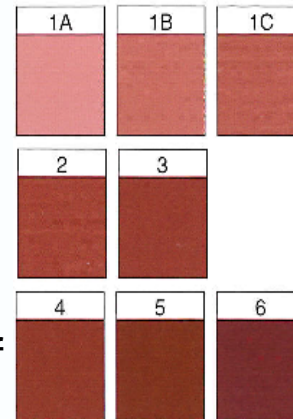
Determine effect of beef meat colour grade on:

Biochemical properties

Microbiological growth

Eating quality

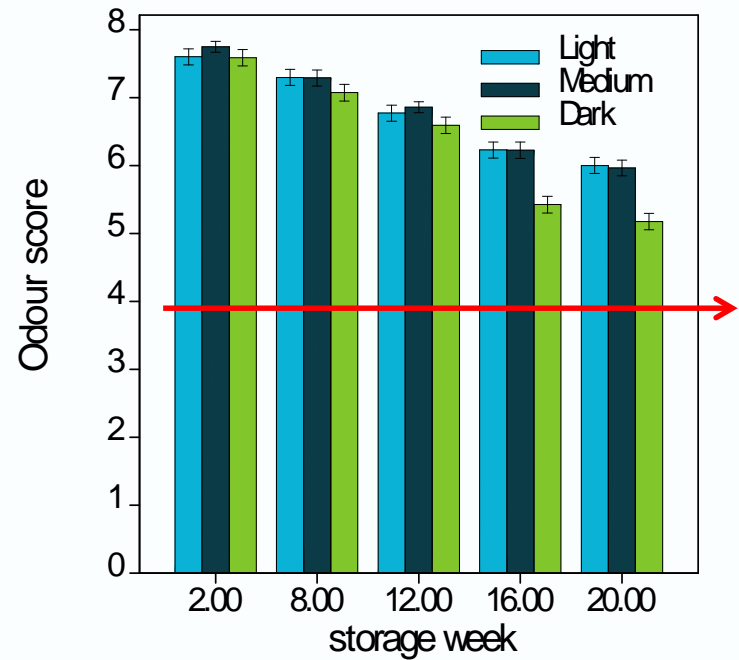
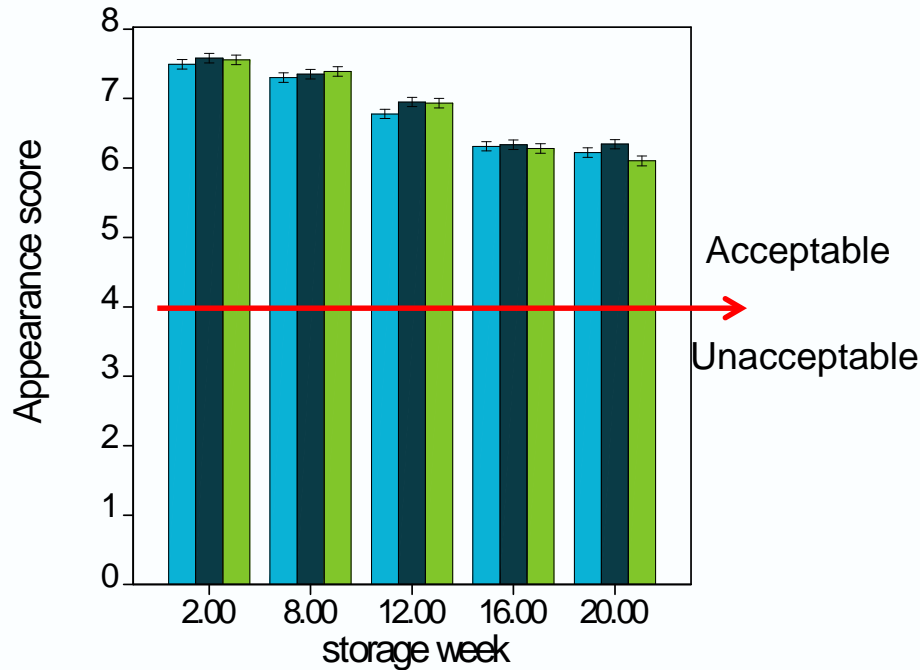
Retail display



Appearance & odour on opening

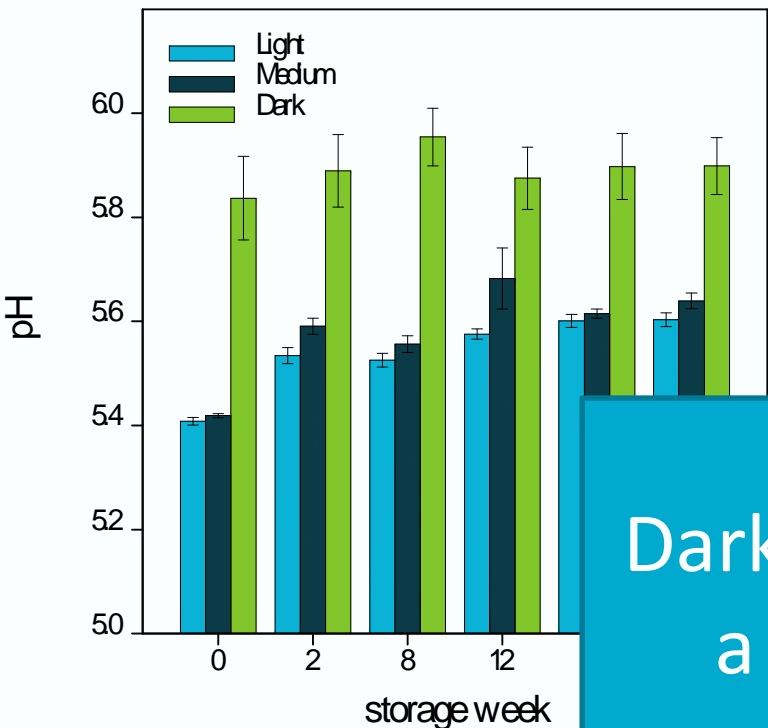
Storing for longer reduced appearance & odour scores

Darker colours less acceptable after week 16



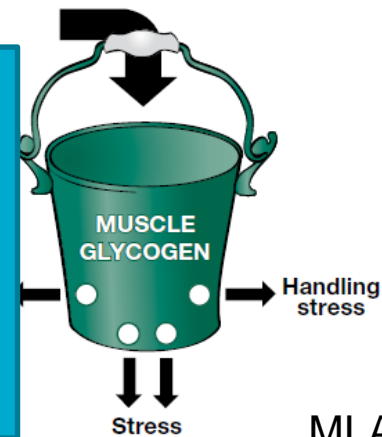
Biochemical properties

Dark meat had a higher pH & less glycogen whereas light & medium colours had a lower pH- similar values observed



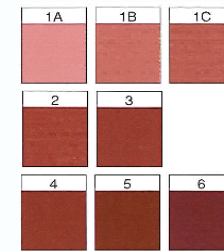
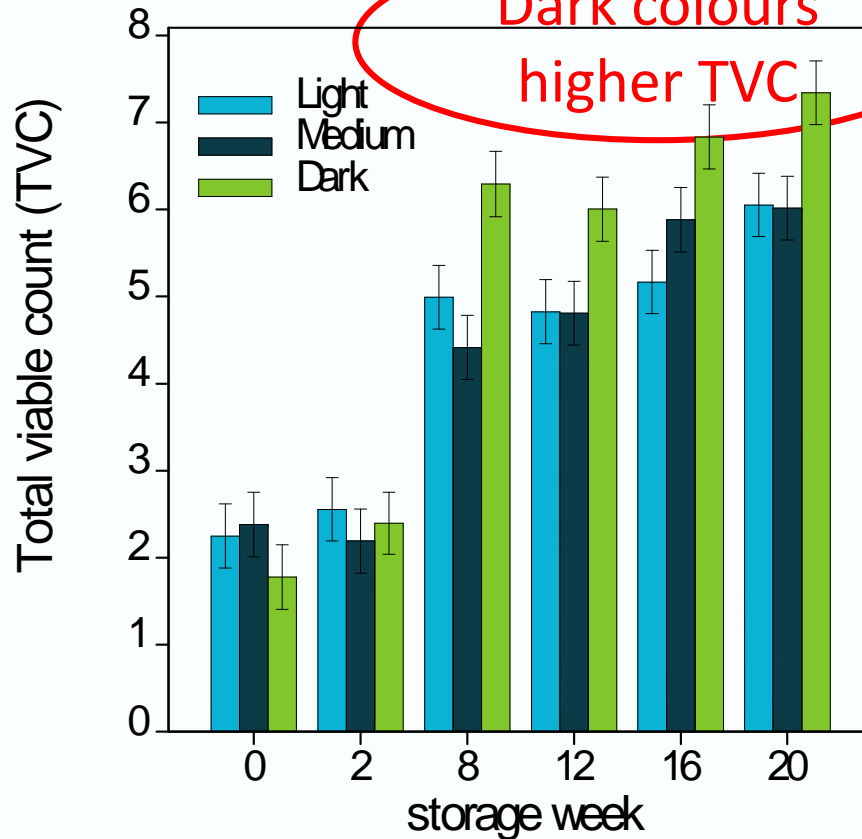
	light	medium	dark
Glycogen ($\mu\text{mol/g}$)	37	37	33
Lactate ($\mu\text{mol/g}$)	22	22	20

Dark colours had a higher pH



MLA 2011

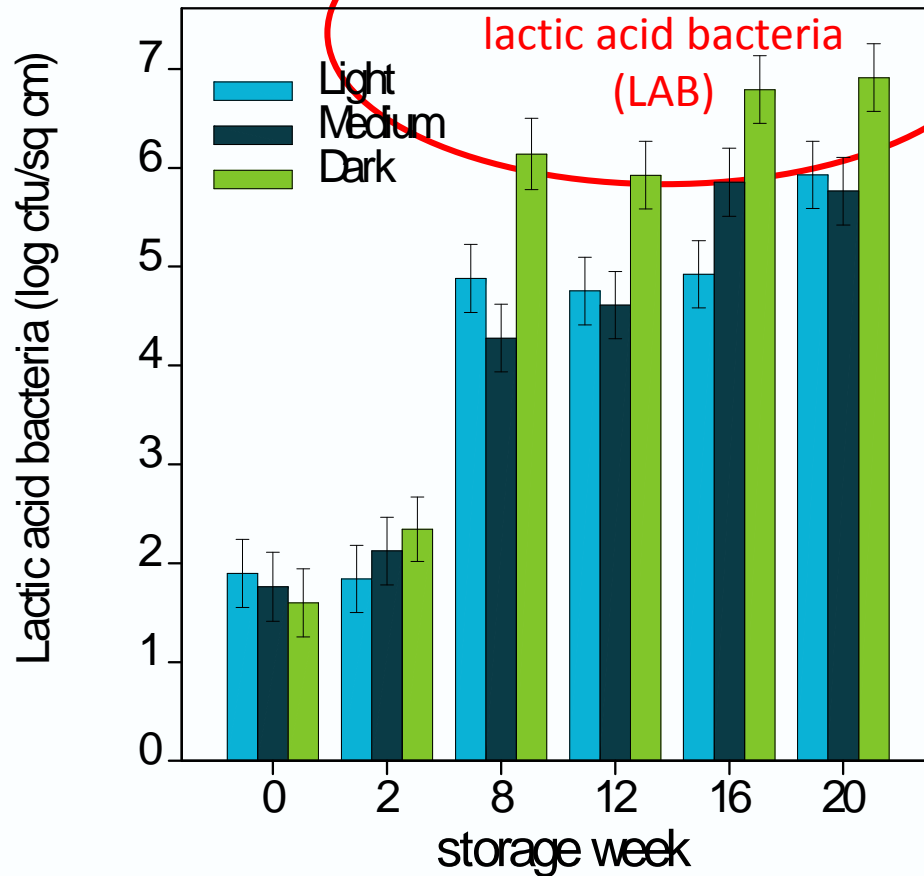
Microbiology- TVC increased at 8 weeks and was higher in dark meat



Total viable count (TVC)

- Increased at week 8 and reached a plateau
- After week 8, dark muscles had higher values compared to light & medium coloured muscles

Microbiology- LAB showed similar to TVC



TVCs & LABs:

- No major differences observed between plants
- 2 plants with hot water decontamination units

Brocothrix:

- Similar increase at week 8, but no difference between meat colours

Eating quality using Meat Standards Australia (MSA)- weeks 2, 12 & 20 only

MQ4 score (out of 100) was calculated by adding 4 sensory components:

- Tenderness 30%
 - Overall liking 30%
 - Flavour 30%
 - Juiciness 10%
-
- MSA eating quality guide separated into:
 - 3, 4, 5 star ratings



Score sheet

Tenderness
Not tender ————— Very tender

Juiciness
Not juicy ————— Very juicy

Liking of flavour
Dislike extremely ————— Like extremely

Overall liking
Dislike extremely ————— Like extremely

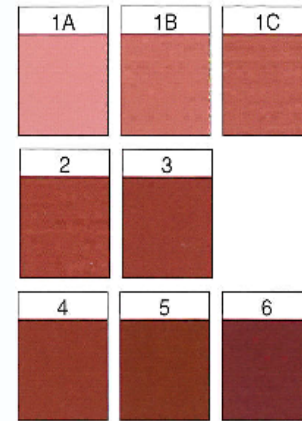
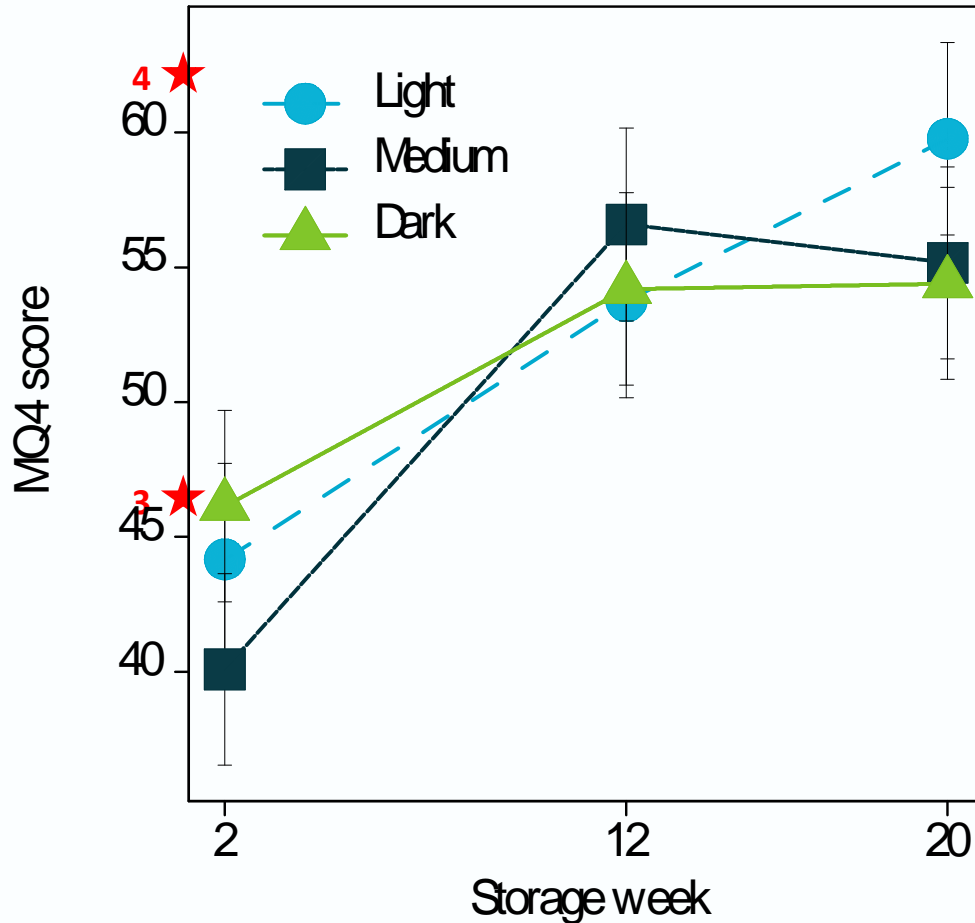
Please tick one of the following to rate the quality of the beef sample you have just eaten.

Choose **one** only (you must make a choice).

- Unsatisfactory
- Good everyday quality
- Better than everyday quality
- Premium quality

MSA MQ4 by colour

Light colours continue to improve

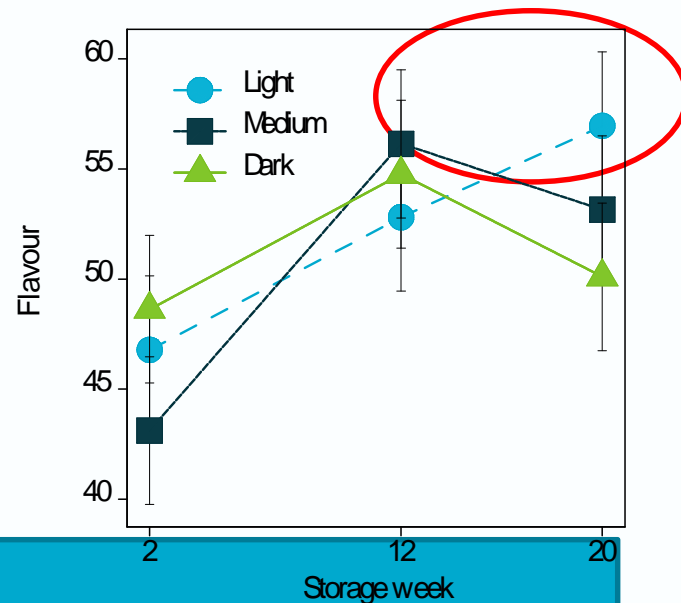
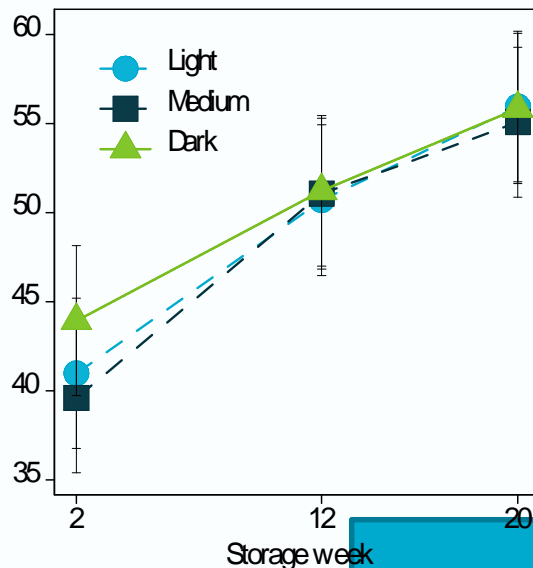
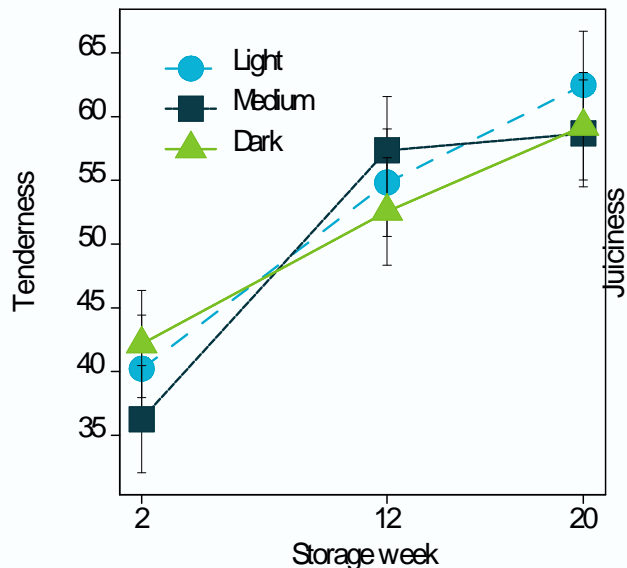


Improved eating quality with storage > 12 weeks

Lighter colours continue to improve

Tenderness, juiciness & flavour

Light colour continues to improve



Tenderness and juiciness scores increased with storage

Flavour started to decrease at 20 weeks, apart from in the light coloured group

Lighter colours continued to improve in eating quality

Retail display steaks

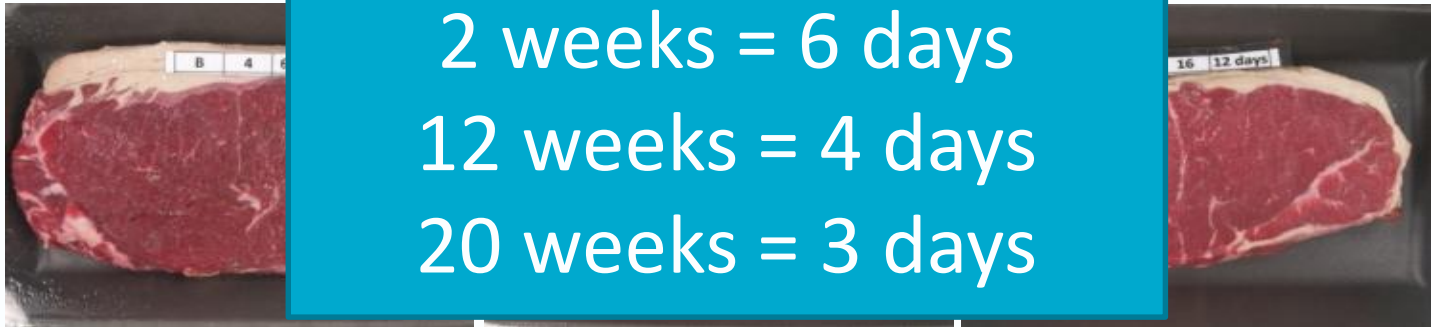
Week 20, after 3 days retail display

Colour groups had a similar retail display life

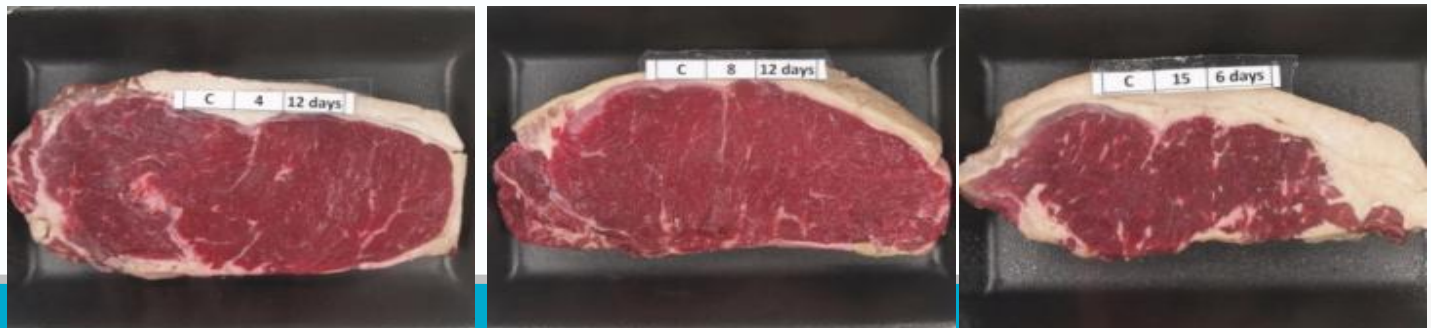
Light



Medium



Dark



Steaks visually suitable
2 weeks = 6 days
12 weeks = 4 days
20 weeks = 3 days

In summary

Storing meat reduced the appearance and odour of the product, but all meat colours were still acceptable at week 20.

The development of spoilage associated microflora was more pronounced in dark muscles & consequently these muscles have a higher likelihood of reduced storage life.

All meat colours improved in eating quality with aging, especially between 2 and 12 weeks.

After 20 weeks storage, MQ4 scores indicate a 3 star product is achieved, meaning light & medium meat colours can achieve a “good everyday” eating quality when stored appropriately.

Future studies/ going forward

Determine shelf life/eating quality of long aged beef for export markets- “real life situation”

- especially to emerging markets
- Biochemical, microbiological & sensory/ eating quality

Current project looking at the effect of purge on shelf-life of vacuum packed chilled meat, especially for Egyptian clients.

ABARES	Beef & veal	Pork	Lamb	Chicken
Export vol 2013-14 kt	1,184/1611	47/360	250/ 470	38/1066
%	74%	13%	53%	4%
Main export markets	USA, Japan & China	USA, Canada & China	Middle east, USA & China	

Acknowledgements

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Sensory:

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- CSIRO team & statistician (Gavin Kearney)
- Beef Processors



Thank you

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