Implications of genetic improvement in beef cattle on nutritional management

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Crookwell Pasture Update – March 5, 2019

Outline

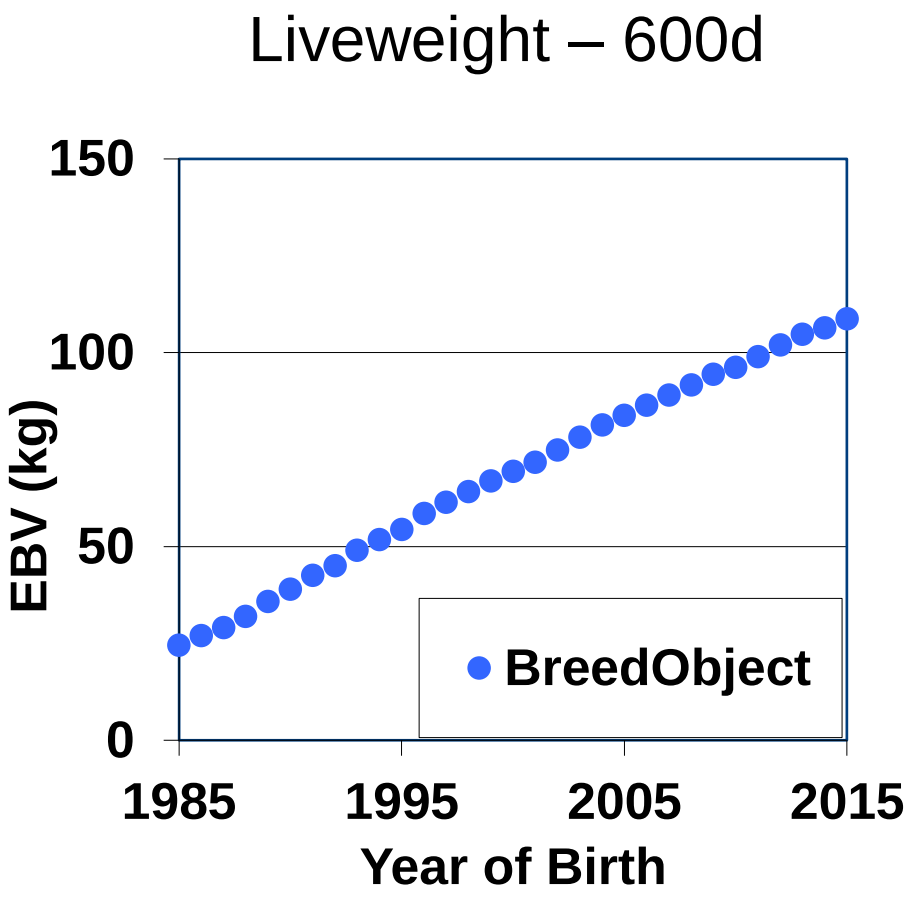
- Genetic gain in beef cattle
- Managing feed supply with improved genetics
- Implications of continued genetic improvement for future production systems

Genetic gain in beef cattle

- Weight and marbling breeding values (EBVs) have increased and P8 fat EBVs decreased over past 30 years

- This affects amount of feed required, and impacts on fatness and on eating quality

Genetic gain in Liveweight



Angus data since mid 1980's

Trait 600d weight ~ sale liveweight

Blue = Breed Object estimated EBV

Orange = Industry value of EBV

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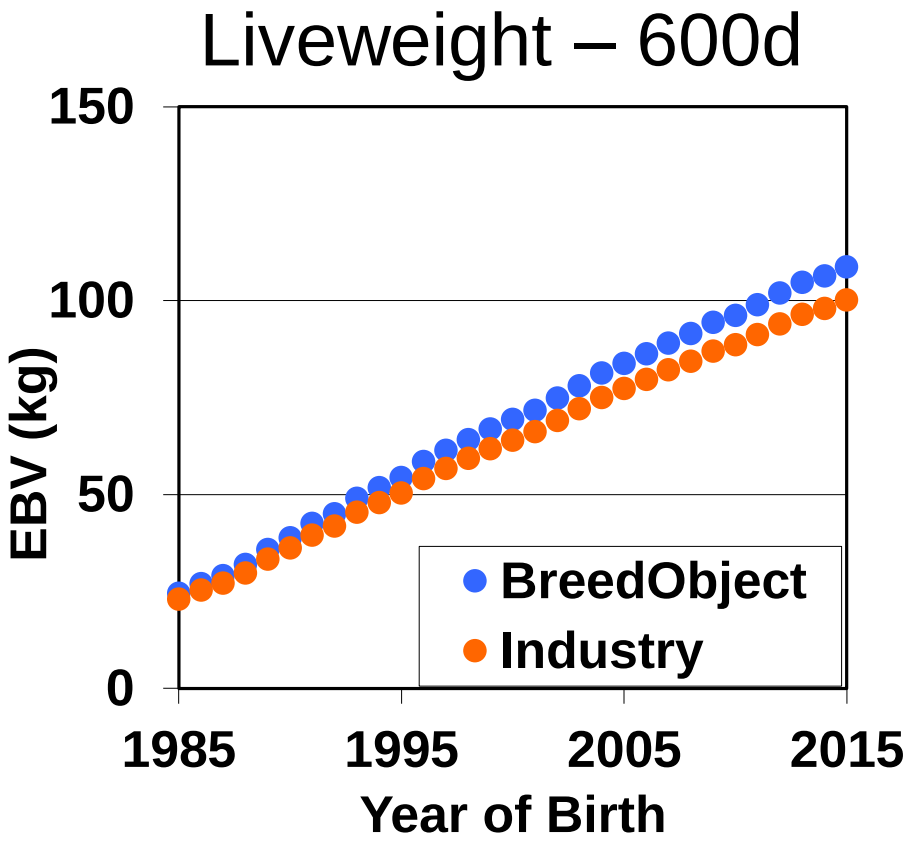
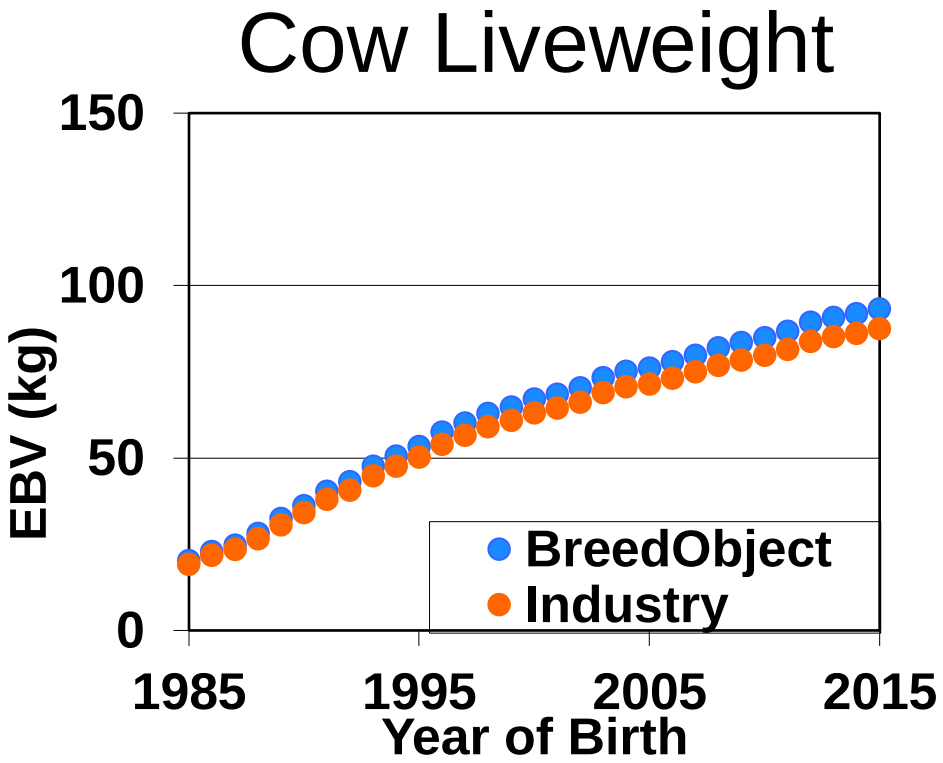
Example – Genetic gain in Liveweight





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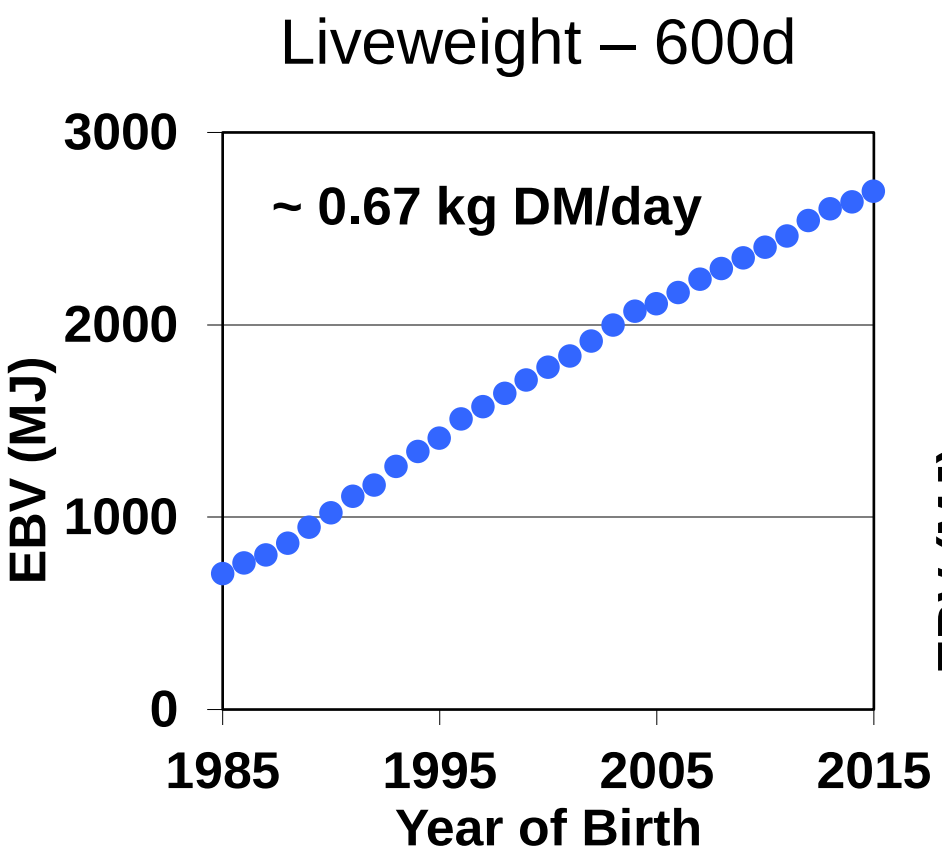
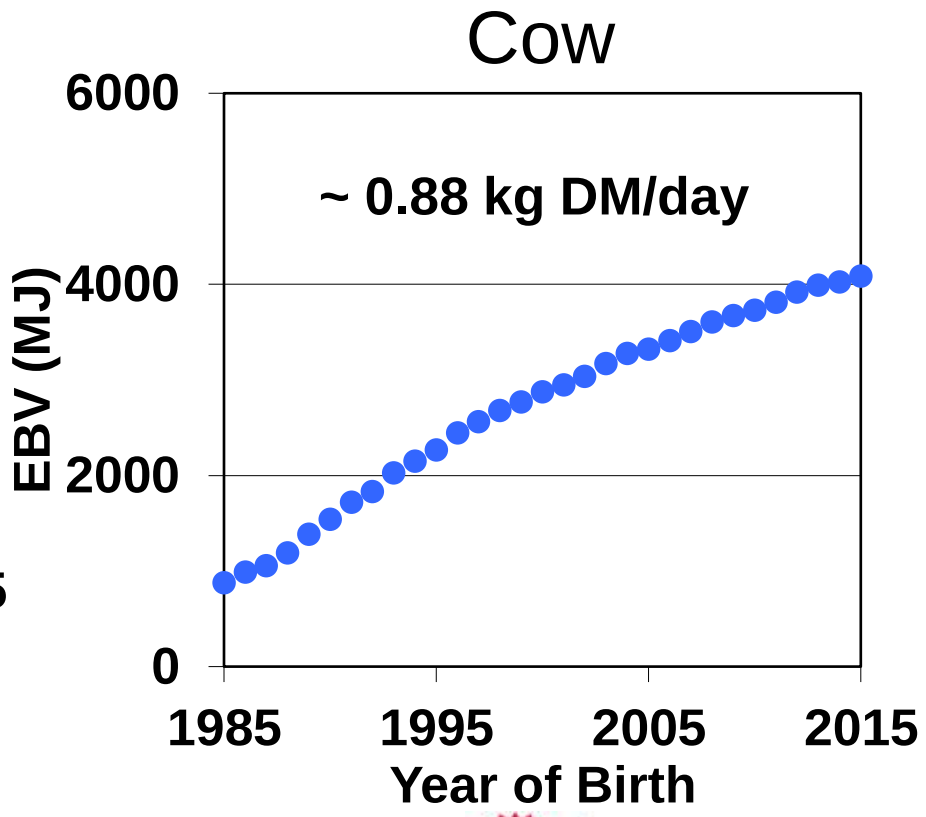
Selection for liveweight also increases feed intake

- Selection for liveweight is to a large part the same as selection for feed intake
  - Genetic correlation between weight and feed intake = 0.65-0.75
  - Opportunity for selection for increased feed efficiency

Selection for weight has increased feed intake

Increase in feed intake kg DM / day – since 1985





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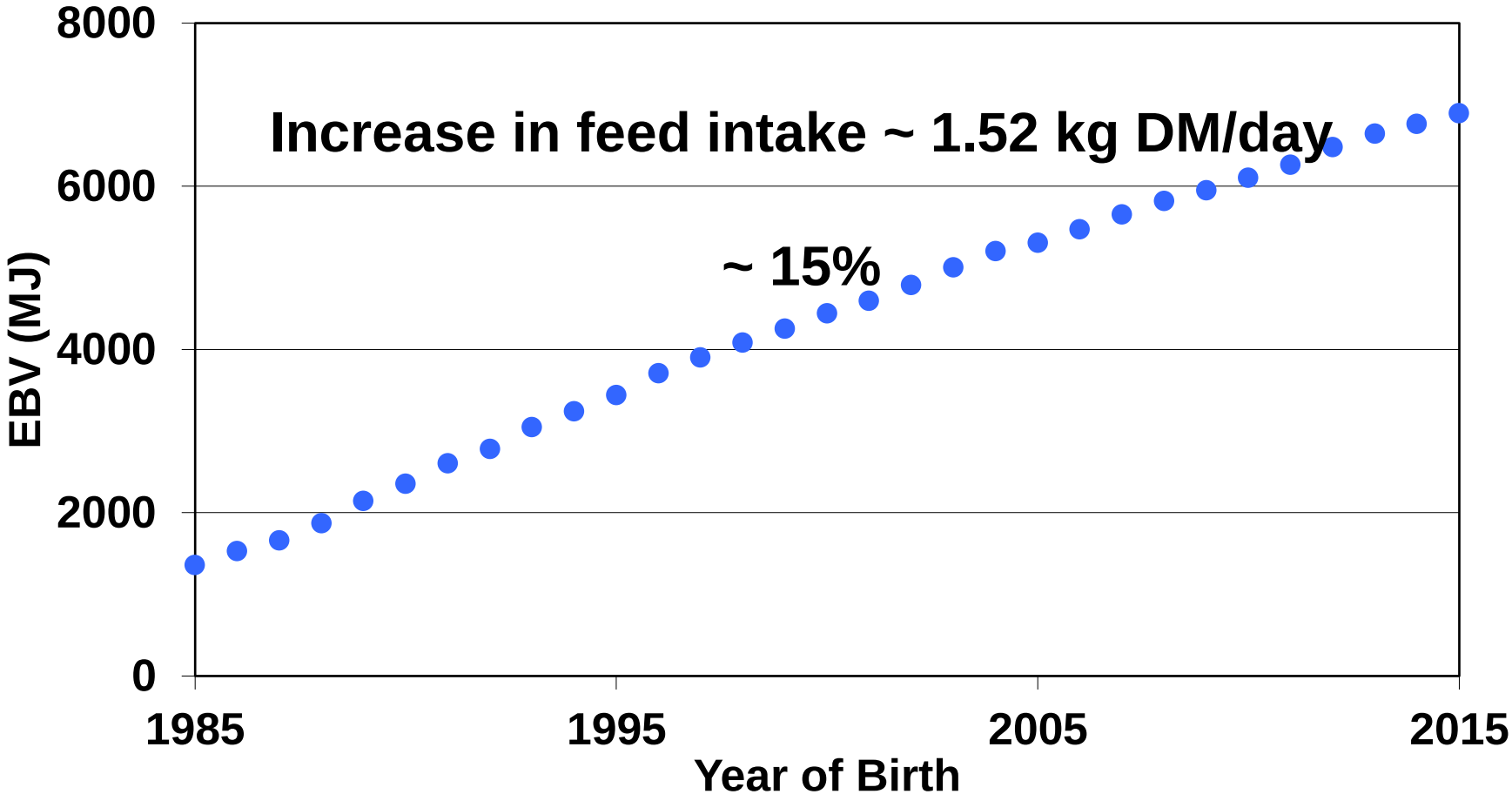
Change in Feed Intake for cow and calf since 1985



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What does this mean?

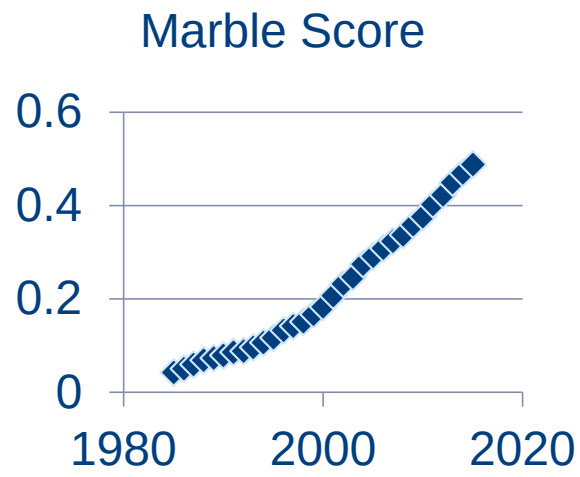
- Feed requirements have increased
- Fat and carcass quality traits penalised if feed management has not changed to account for improved genetics

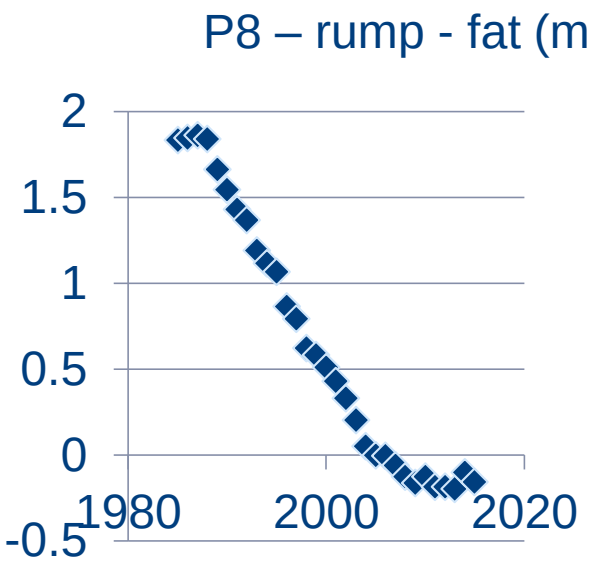
Selection for fat traits

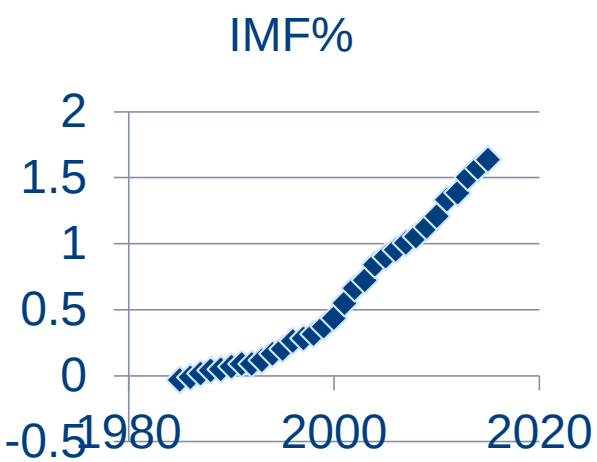
- Selection has increased marbling and IMF EBVs and decreased P8 fat EBVs

- …at same time as increased weight EBVs

Genetic trends in marbling and fatness - Angus







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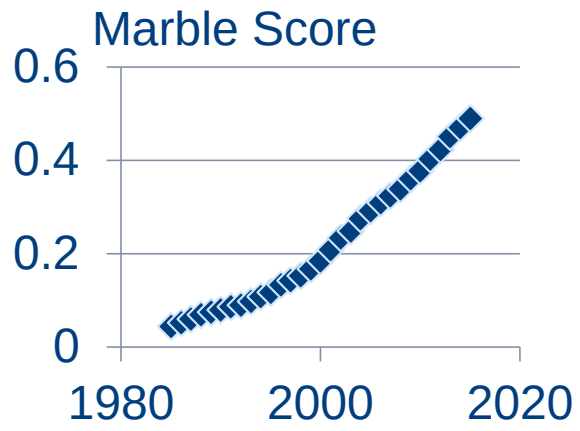
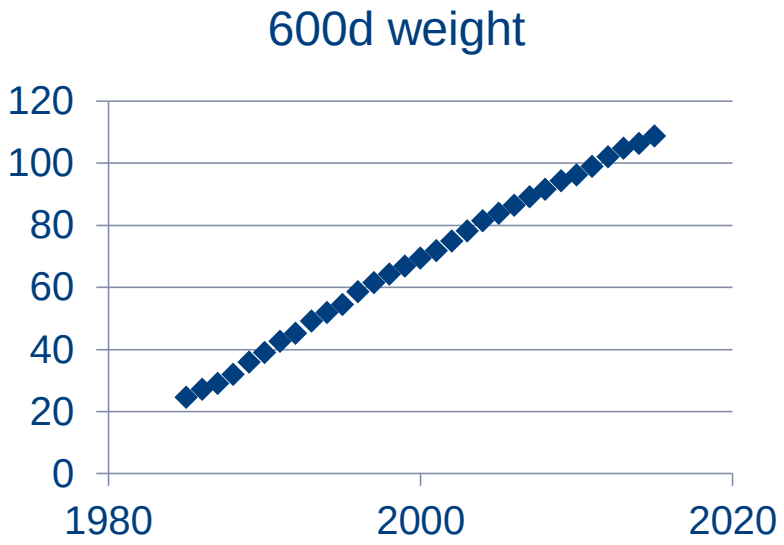
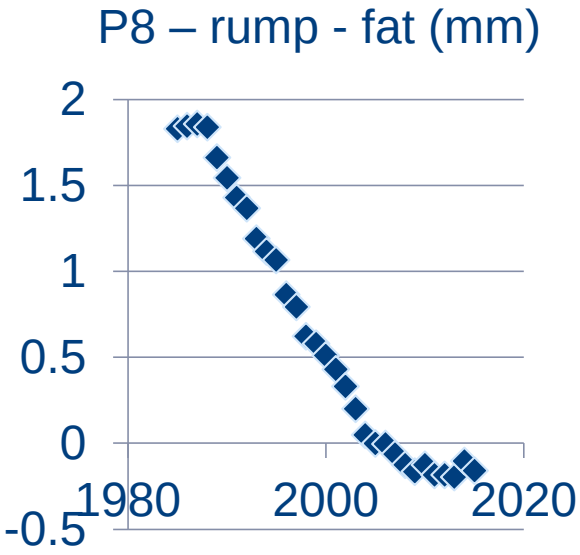
Genetic trends in weight and fatness - Angus







	1985	2015
Weight	500kg	590kg
P8 fat	10mm	8mm
Marble score	1	1.5

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Effect of genetic change on fatness

	1985	2015
Weight	500kg	590kg
P8 fat	10mm	8mm
Marble score	1	1.5
Fat in Empty Body	22%	16.4%

Decreased fat % in Empty body reduces stores of energy for cow & calf

…but it increases carcass yield of slaughter cattle

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Implications – 1. Cow & calf

- Selection of cattle for increased 600d weight, more marbling and less rib or P8 fat decreases fat % in body
- …and the (now) bigger cattle eat more
- Increases feed required to optimise cow & calf performance, and increases sensitivity to under-feeding

Implications – 2. Eating Quality

- Selection of cattle for increased 600d weight, more marbling and less rib or P8 fat decreases fat %
- Increases carcase yield, and MSA grade (because Marble Score is a big determinant of MSA grade).
- Yield, marbling and eating quality are determined to a considerable extent through genetics, but nutrition also affects marbling and MSA grade

Summary – genetic trends

- Genetic improvement of Angus cattle over past 30 years

- Changed carcase attributes
  - Bigger cattle, heavier carcasses, more marbling, less P8 fat
- Increased feed intake
  - Equivalent to an increased stocking rate of ~1.3 DSE / cow & calf unit

- Driven by demand
  - larger carcasses and increased “quality” in young stock
  - “quality” ~ eating quality = MSA grade
  - “quality” ~ better yielding ~ less fat trim

Managing feed supply with improved genetics

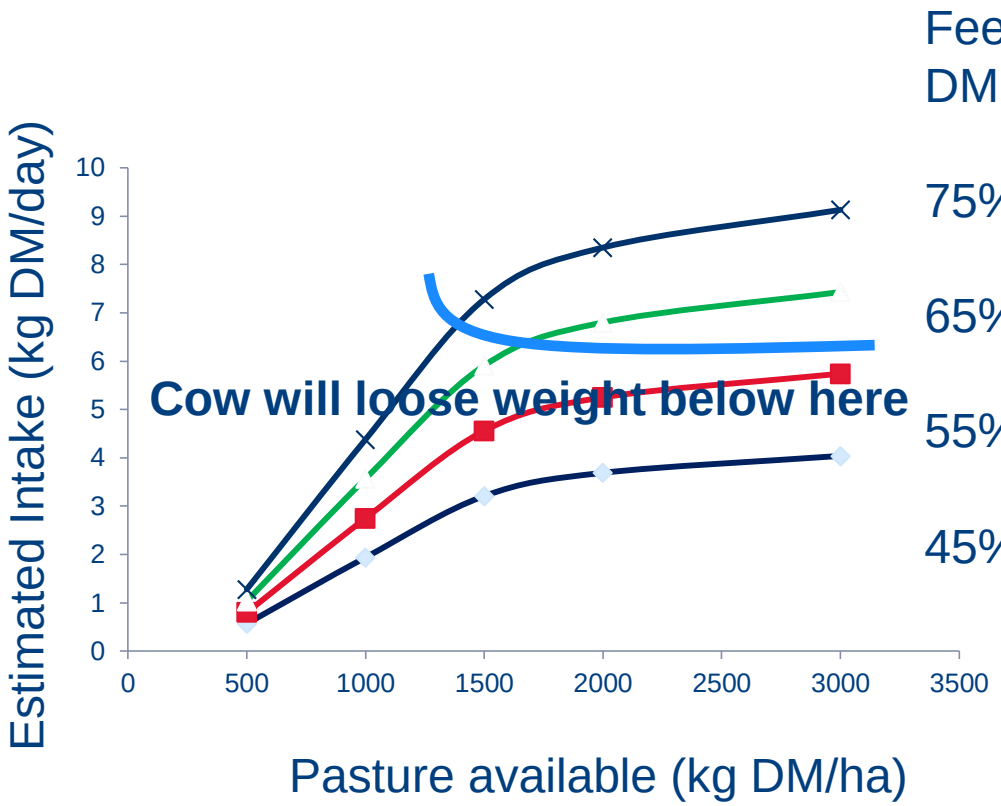
- Bigger cattle eat more = increased feed demand
- Stocking rate for Cow & calf has increased by ~1.3 DSE
- Cattle less resilient to shortfall in feed supply
- Genetic improvement requires better feed management

Cows (and Calves)

- Cows are now bigger, have less P8 fat
- Need more feed to maintain condition

- Tools
  - Understand pasture and animal characters that drive feed intake
  - Fodder budget

Estimated feed intake Dry cow (550kg) v pasture quality and availability



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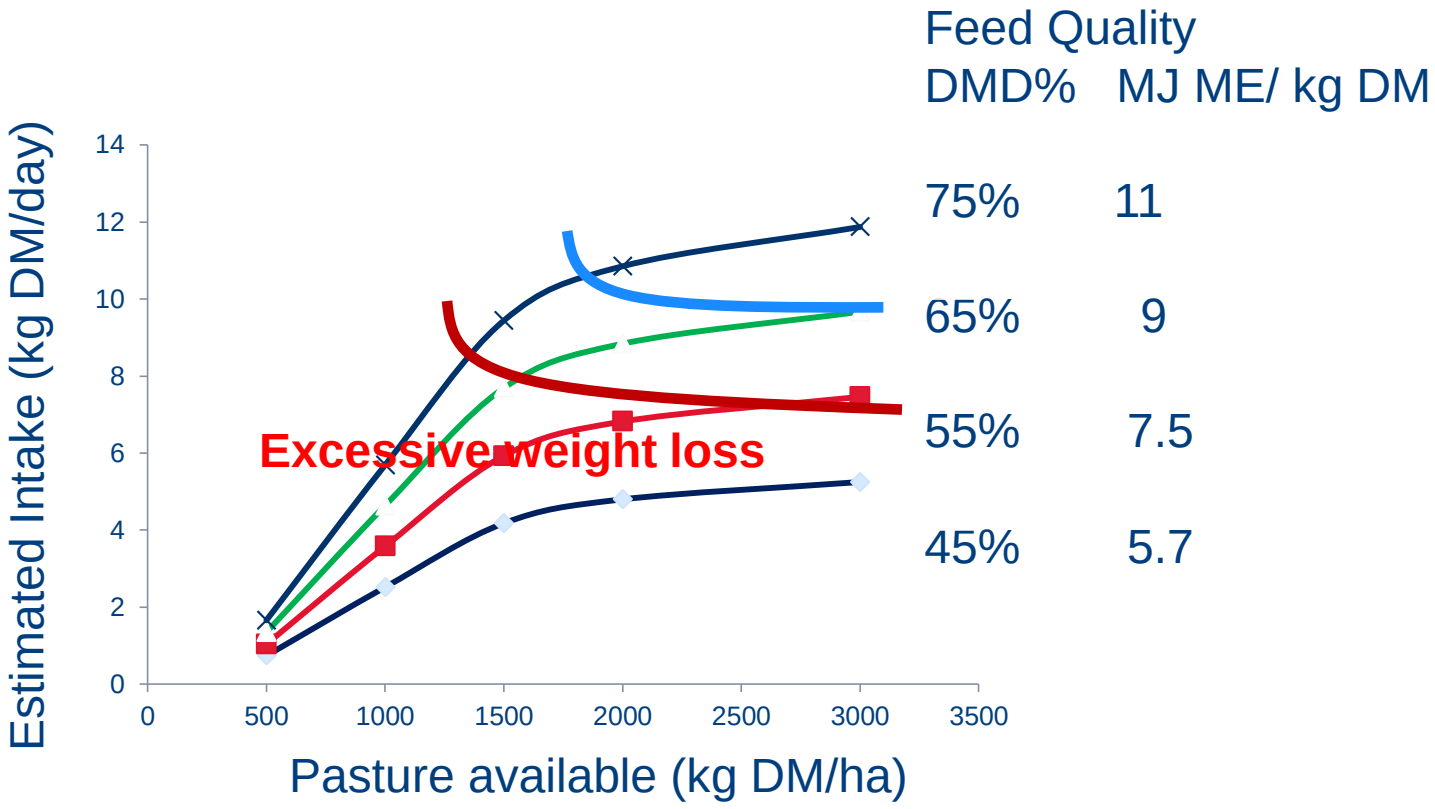
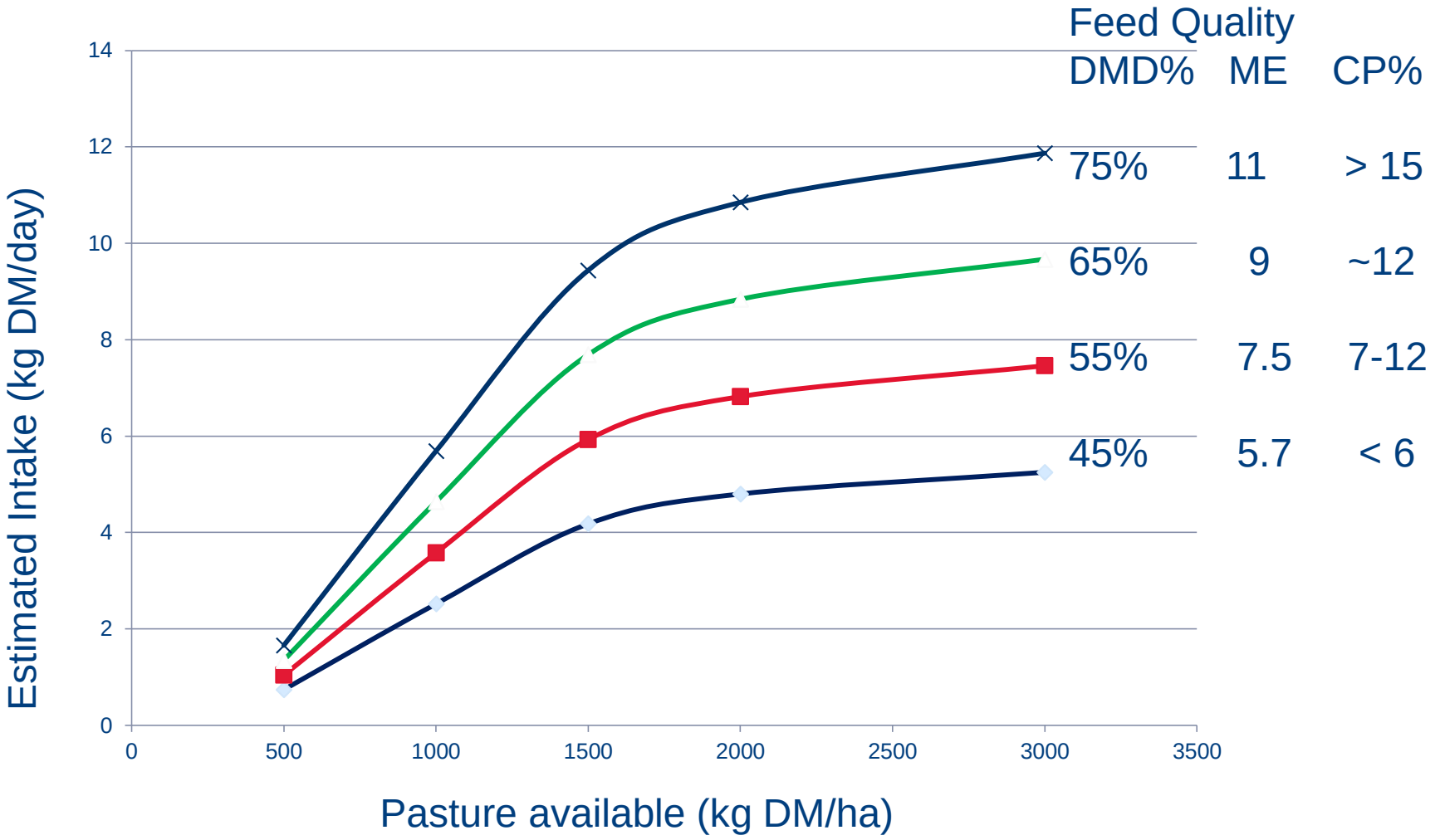
Estimated feed intake cow (550kg) with calf at foot v pasture quality and availability



Supplementary feeding - principles



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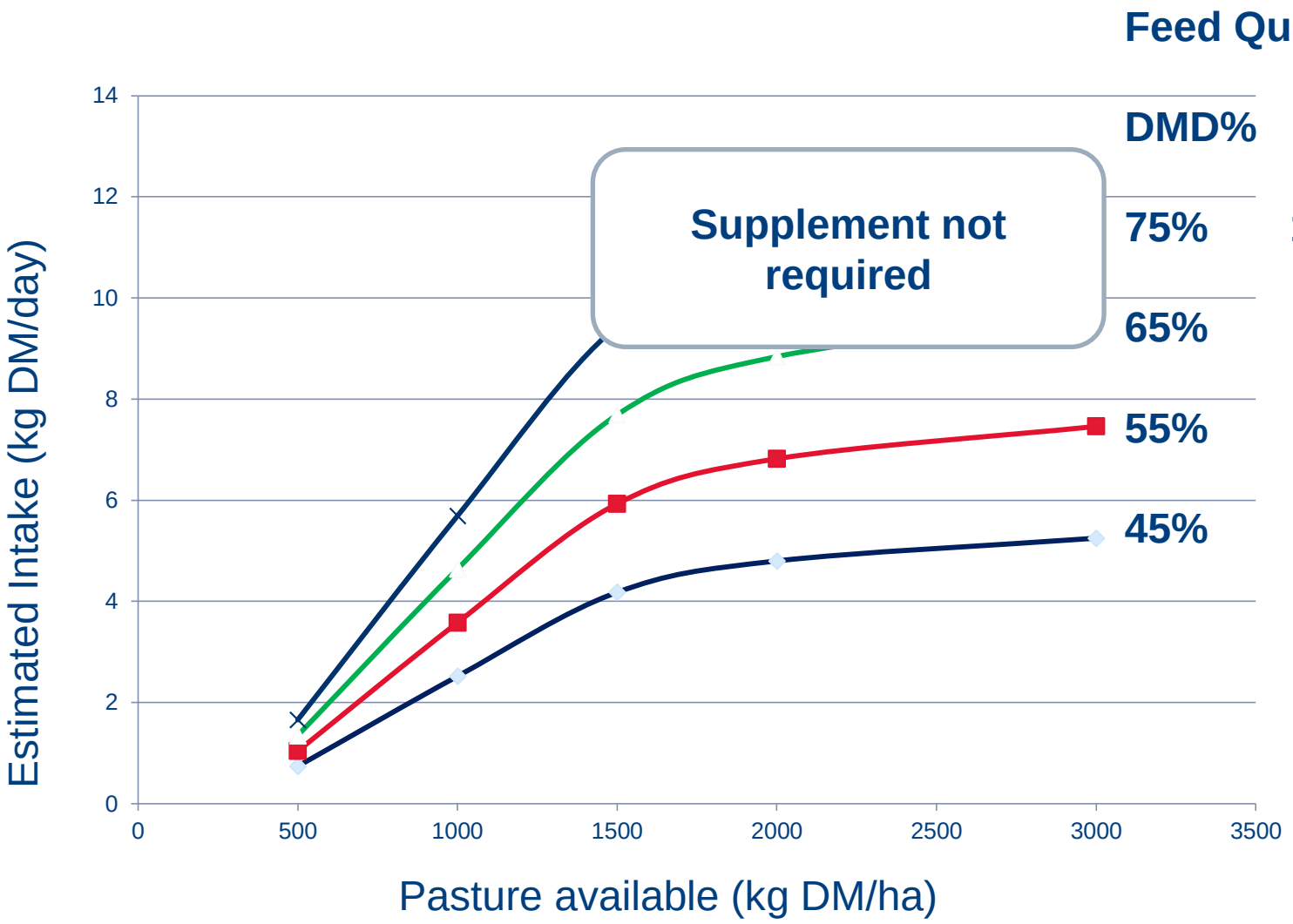

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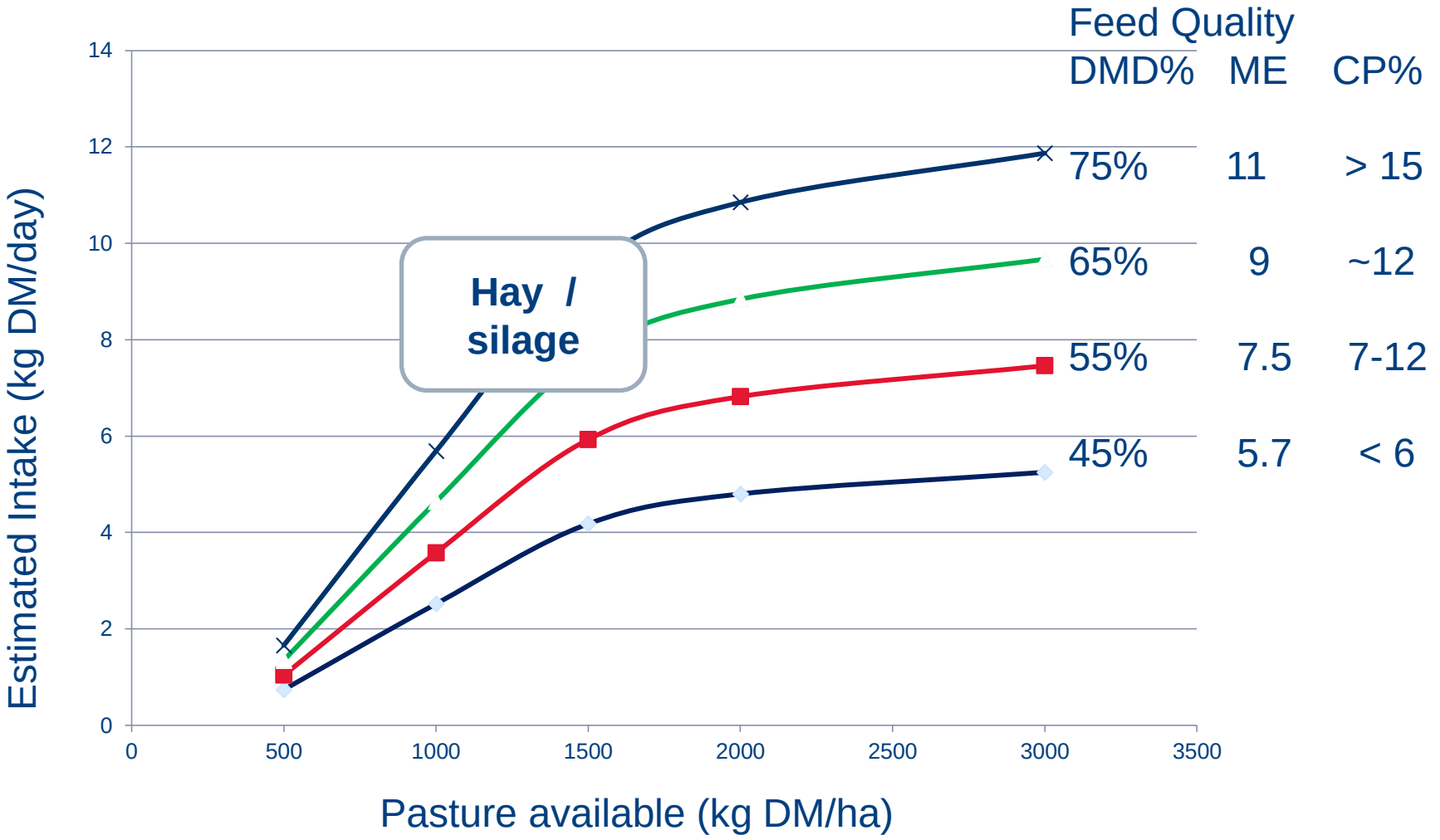

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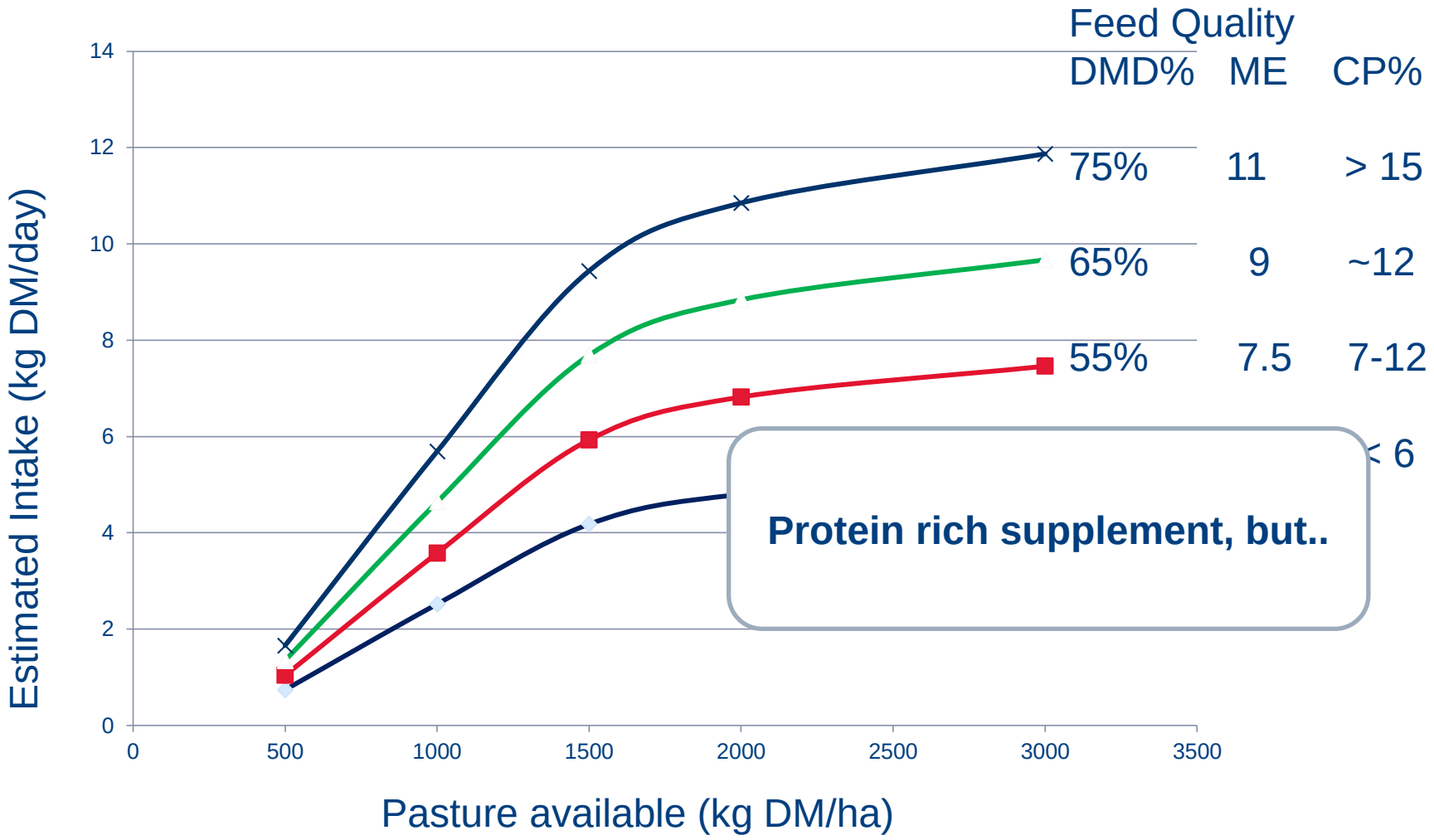

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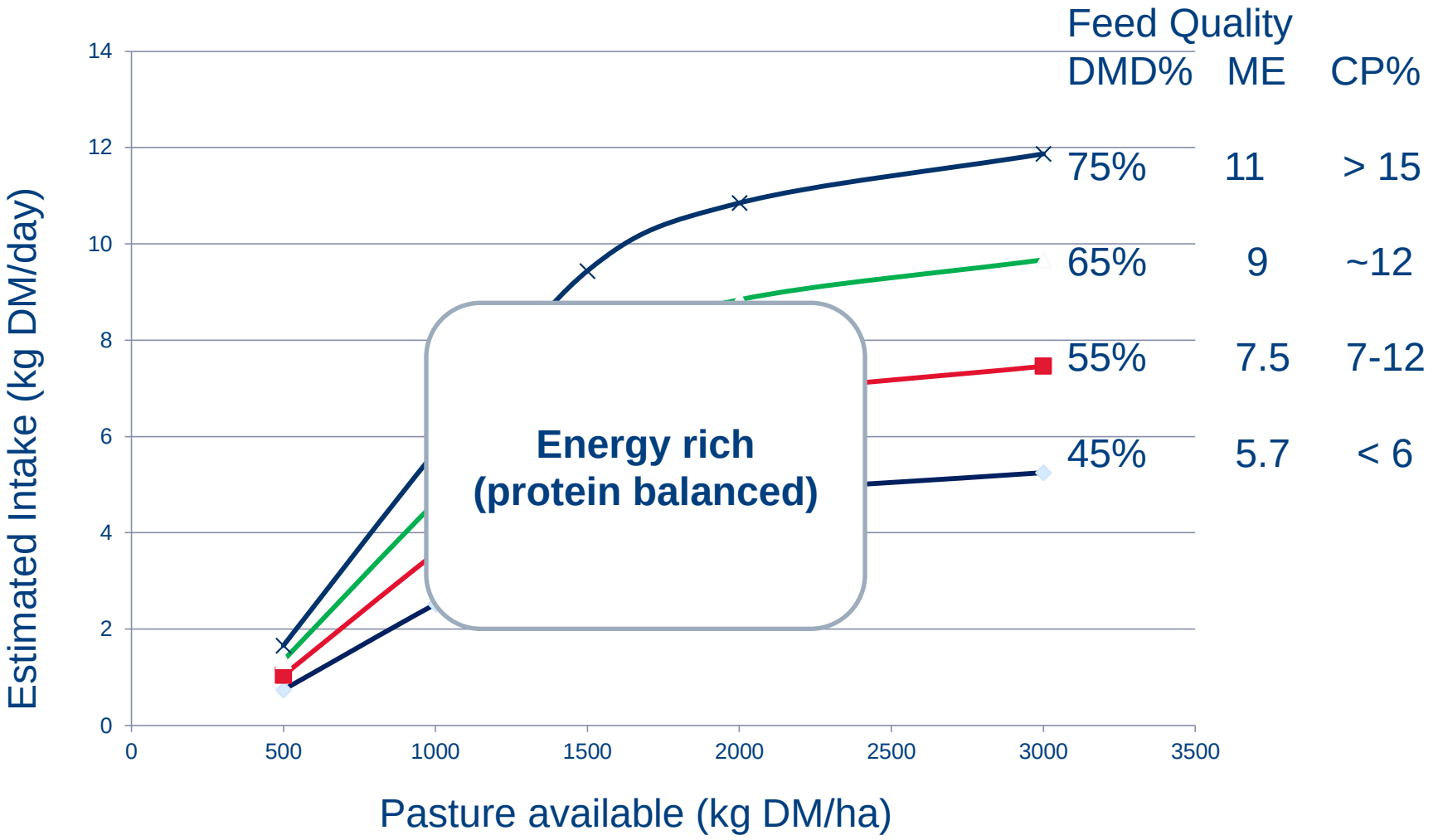

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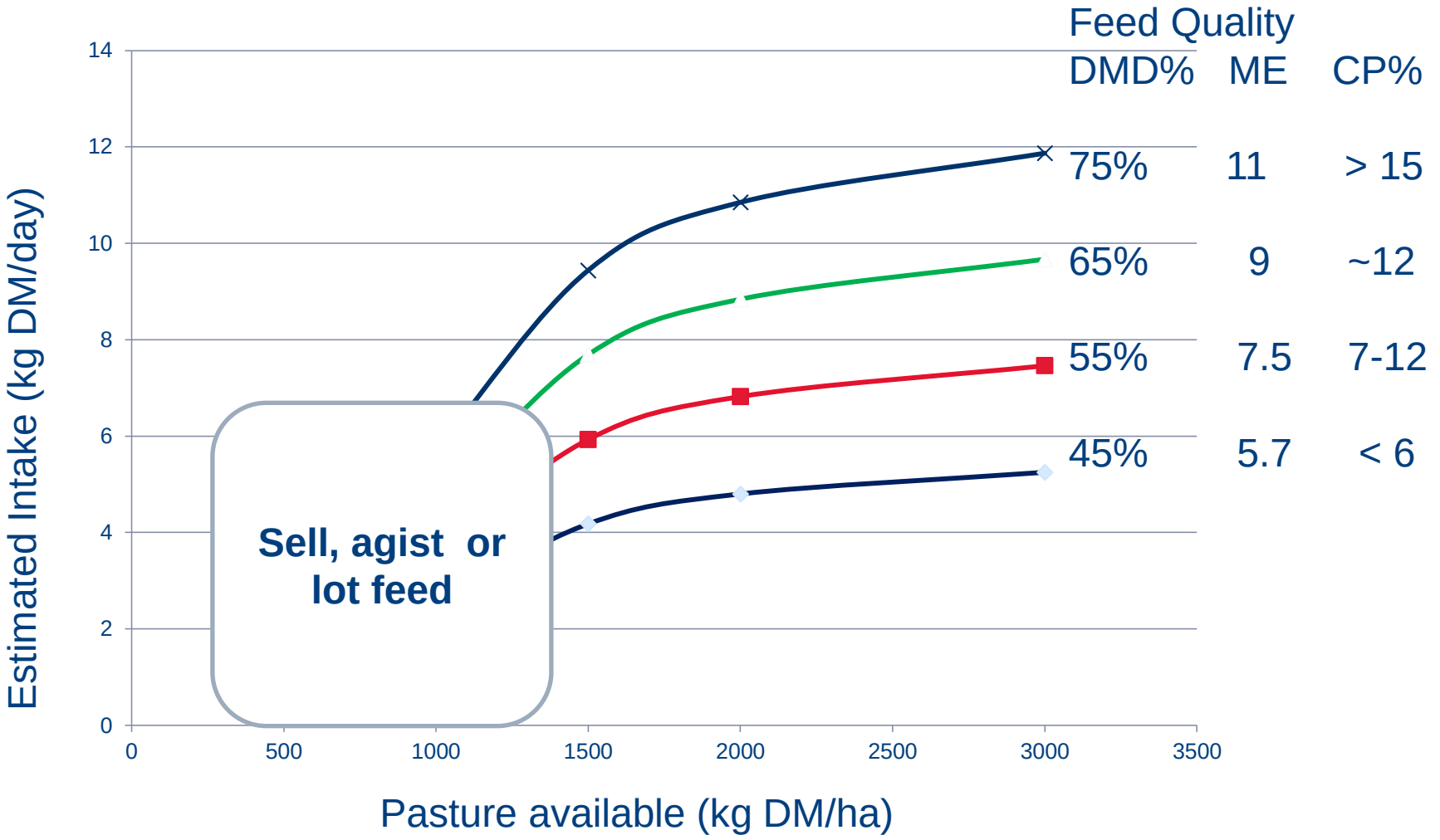
Supplementary feeding - principles



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Fodder budget !!!

- Know livestock requirements
- Know pasture available and potential time line
- Know other feed on hand

- Do the Maths !!
  - Tools include:-
    - https://www.mla.com.au/extension-training-and-tools/tools-calculators/
      - MLA Feed Demand Calculator
      - MLA Stocking Rate Calculator
      - Pro Plus DPI fodder budget tool

Finishing young stock to targets

- Same supplementary feeding principles apply

- We have developed tools to help hit targets
  - BeefSpecs
  - BeefSpecs drafting tool
  - Lean meat yield and MSA calculator

- Use description of cattle and estimated gain in production system to predict fat cover carcase weight (and yield and eating quality)

- Go to a BeefSpecs tool

Feeding and meat quality

- MSA grade mainly marbling = fatness

- Control fattening through growth rate and final weight
  - More marbling in heavier carcasses
  - Must maintain growth to maximise marbling
  - Some additional fatness on high grain diets

  - Good genetics is important, but so is good feed management

- Think about of potential returns before committing to increased weight and feed costs

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Implications

- **Genetic improvement has delivered**
  - Larger animals with better marbling
    - Better meet market needs
  - Require more feed (reduced stocking rate)
  - and will continue
- **Feeding**
  - Improved feed supply needed to get full return from improved genetics
  - This won't change with current breeding direction

The Future

- Market will continue to drive changes in carcass weight, yield and eating quality
- Cattle will be bigger and eat more

- The environment is changing – less rain, more evaporation, less fertilizer = less growth
- Previous projections of feed supply are not adequate
- Improved management of feed resources will be necessary

Thanks for listening

Questions?

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