

A Summary of Growth Path Effects on Carcase and Meat Quality

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Variations in growth can have important affects on meat quality There are some critical stages through the life of an animal that determine subsequent growth, carcase composition and meat quality. Profitability can often be influenced by these variations. Key areas discussed here include Growth checks; Pre-weaning growth; Post weaning growth and backgrounding; Growth factors affecting meat quality.

The concept of a "growth check"

Many producers consider the concept and magnitude of a growth restriction (or growth check) in terms of a % reduction in growth rate, but the concept is best defined in cellular terms. Consider the following argument: An animal has a predetermined rate of cell development which is the product of (a) the genes, (b) the nutrient supply and (c) the disease status. Lets use nutrient supply as the trigger.

A growth check is a reduction in growth rate from nutrient supply such that development of cells occurs in a way that long term effects remain. i.e brought about because something has happened to the "normal" or "expected" pattern of cell development. The key is not a % (kg/day) reduction, but a change in cell development that has long term effects. This is most likely to occur if the check is in young cattle.

Growth check affects on body fat content, carcase yield and efficiency

With an **early** restriction and then recovery in cattle undergoing compensatory gain, these will be fatter at the same weight as well grown cattle. With a **late** restriction and recovery in well grown cattle undergoing compensatory gain, these will be leaner at same weight as well grown cattle. If the restriction occurs **early in life**, the **effect** is usually **greater** than if the restriction occurs later in life.

The critical point has yet to be fully determined, however

we think that the following principles apply.

Effect of growth restriction changes from fatter to leaner at around 250 - 300kg liveweight (about 40% of maturity).

If it occurs before 250kg you end up with fatter & less efficient cattle. If it occurs after 300kg you end up with leaner & more efficient cattle. It is very important to "set up" cattle relative to your production system and your market objectives.

Be aware of the implications of variations in growth and how they can affect your bottom line - primarily your ability to meet specifications.

Specifically, if restriction occurs before 250kg, for at least 2 months, at < 0.4 kg/day, then upon re-feeding, protein mass (the amount of meat) may not catch up BUT fat deposition may start earlier than normal. Animals may then grow slower & be fatter than their well grown brothers & sisters. Also, if restriction occurs after 300kg, this reduces rate of protein (meat) and fat gain BUT upon re-feeding protein (meat) usually catches up HOWEVER fat deposition may be delayed. These cattle may be leaner at the same carcase weight.

Examples

Lets consider some typical growth rates and what would or wouldn't be considered a significant growth check with commercial implications.

1. Cattle growing at 1.3 kg/d and growth drops to 0 kg/day for 6 weeks

Lets say the check occurs at 300kg. No significant effect would be expected, except marbling is likely to be reduced and the animals will be older and have a higher ossification score. If the check occurred at 100kg and growth rate was 0kg/day for 6 weeks, the effect would be substantial and lead to the animal subsequently being fatter. i.e. stuffed the muscle cells!

2. Cattle growing at 1.0 kg/day and drop to 0.8 kg/day

Before 300kg there would probably be no long term effect, other than these cattle would be older at the same weight. A growth check to 0kg/d before 200kg would start to substantially influence body composition. They would be fatter and re-growth would be slower.

If it occurred after 300kg, they would compensate. A drop from 1.0kg/day to 0.6kg/day would have similar expectations as a drop to 0.8kg/day, but the effects would be more severe, with the exception that the 0.6 kg/day would by itself start to influence future growth rate.

3. Young cattle growing at 0.4 kg/day

This is a serious growth check already. There is little scope for growth to go down further and the sooner you can move it up, the better off the animal's long term prognosis will be. So there is no single % reduction that defines a growth check. It depends on when you start and how severe the growth check is.

4. Early weaning growth (weaning at 3-4 months of age)

With slow growth: (0.4 kg/day @ < 200kg)

- leaves you with a lighter end product
- affects feedlot growth – animals don't recover and grow slower than normal
- increases variation in carcass weight – you get a bigger tail in the mob
- decreases potential for tender meat and they are generally "chewier"

5. Pre-weaning growth

With slow growth: (slow growth is defined as < 0.5 kg/day)

- muscle structure (and cell development) is changed
- calves don't catch up despite having access to high quality feed after weaning
- however no consistent effect occurs on eating quality – the result can go either way from an early growth check – that is, the meat may be tougher or more tender – hard to predict.

Research suggests a growth rate of > 0.6 kg/day until > 250kg will minimise risk of tough meat.

6. Post weaning growth

High background growth rate gives

- less weight gain during finishing stage
- more fatness and more marbling
- less retail yield (%) and improves the potential for tender meat

7. Market examples

For the B3 Japanese high marbling market such as that supplied by Rangers Valley, a higher growth rate during backgrounding is desirable, but remember, marbling is also governed by genes.

For the Domestic high yield & low fat market, a lower growth during backgrounding is desirable. Cattle will grow faster in the feedlot and will be leaner rather than fatter when finished.

For very long fed product i.e. 360days – probably reach near maximal marbling regardless of backgrounding conditions as there is time for fat deposition to catch up – that is the effects will be far more pronounced for shorter fed product i.e. around 150-250 days.

MSA/Eating Quality Affects

Faster growth gives:

- more fat and more marbling.
- younger animals and lower ossification (long term "growth" effects).
- higher muscle glycogen buffer which protects against high pH >5.7 and dark cutters (short term "stress" effect).
- Lot feeding generally gives a more tender product

Summary

- Be aware that each stage of an animals development can have an affect on ultimate fatness, yield & meat quality
- Decide whether the affect may be economically important to your clients
- Take action to address potential problems if it's economically viable to do so or if it will contribute towards maintaining market access
- It's desirable to achieve at least 0.5kg/d (maybe even 0.8kg) in the 2 weeks leading up to slaughter. This assures muscle glycogen concentration and so reduces risk of high pH or dark cutting meat.

