

Meat for ever – quality, sustainability, survival



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The year 2020

(yes I know we will have issues of market access and carbon footprints but we will have solved them)

- You, the customer will go into a supermarket or meat retailer
- You choose New Zealand because of reputation
- The meat will be electrically stimulated, have a quality specification and guarantee and be sustainable
- The meat will be from New Zealand owned/operated cutting/distribution centre
- The animals will have been low stressed (welfare issues will not occur)
- Tenderness will have been monitored for final eating satisfaction
- New Zealand will be the best high quality meat producer in the world**

Why not!

How will we achieve all this?

- We need to improve meat quality and be environmentally and economically sustainable
- We now grow animals, process, sell and distribute meat based on a complex series of myths
 - These myths are not urban myths like the “NY sewers are filled with giant alligators” or “dinosaurs co-existed with cavemen”
 - These myths are so called “conventional wisdom”
- John Kenneth Galbraith coined the term “conventional wisdom” – the association of *truth and convenience* – simple convenient comfortable and comforting and accords with self interest and well-being.... **and avoids unwelcome dislocation of life.**

- Remember “Reality never extracts as heavy a price as ignorance of reality” (James Flynn)

“Conventional wisdom” pervades the meat industry

- ❑ It makes it easy to avoid change as we naturally avoid “unwelcome dislocation of life”
- ❑ We don’t pass knowledge along the technical, managerial and governance chain adequately as it is difficult to convince everyone
- ❑ **Not everyone believes all myths all the time, but as they represent links in a chain, singly they inhibit progress and collectively they prevent it**
- ❑ We will progressively improve meat quality by addressing all myths

***Many established procedures under
conventional wisdom are sanctified under
the phrase “Best practise”***

Myth: Marbling “most important” for tenderness

Reality:

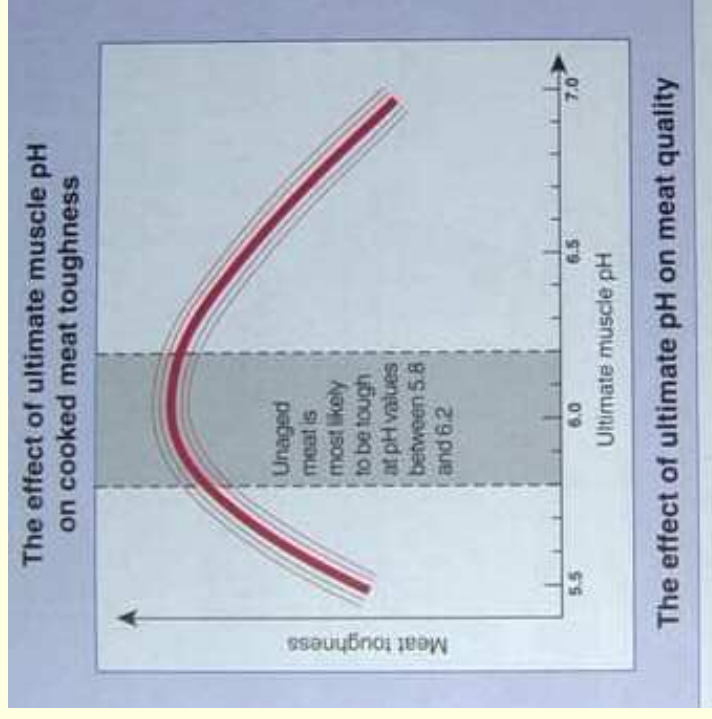
- ❑ Some marbling is necessary for palatability it is true.
- ❑ From this point it is minor
- ❑ Get everything else right first
- ❑ It requires large increases in marbling to produce detectable changes in palatability
- ❑ Marbling requires high energy feed
- ❑ We can have tender meat without excessive marbling
- ❑ Marbling can be an art form – Oh well that’s ok if one pays for it!



Myth: Welfare has little effect on quality

Reality:

- ❑ Welfare is one of the most critical things in meat quality in a pastoral situation and for all production systems,
- ❑ When we reduce stress meat quality improves and is consistent



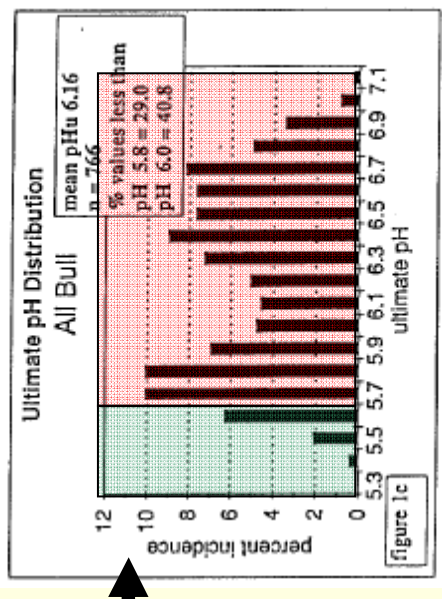
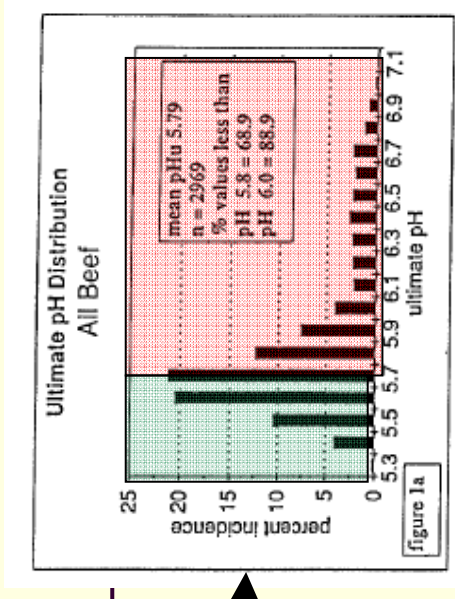
Elevated ultimate pH major problem in bulls - survey results

results

- ☐ Cattle can be affected slightly by stress

(green is good)
(red is bad)

- ☐ Bulls really are affected by stress—only 30% would be high quality

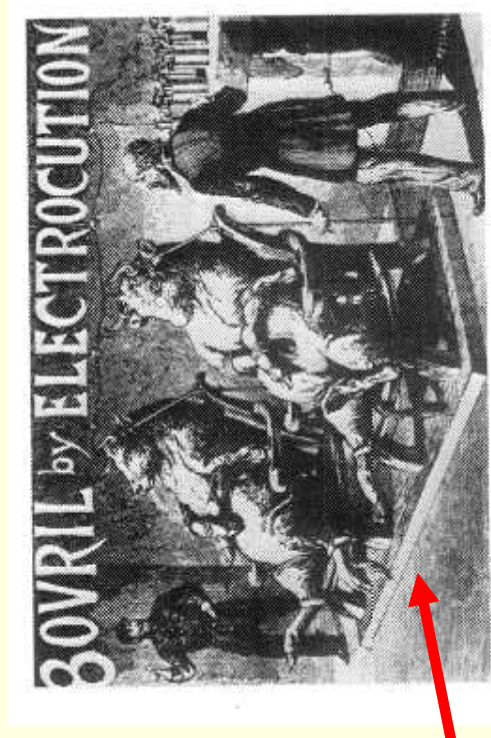


Without stress bulls have high quality lean meat. With stress we use bull meat for manufacturing (the failsafe option).

Myth: Electrical stimulation only prevents cold shortening, causes some quality defects and doesn't directly affect tenderness

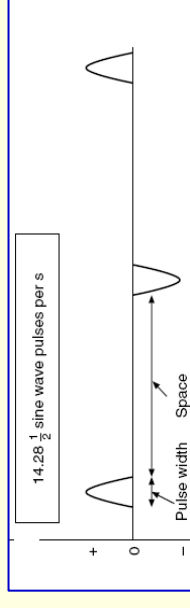
Reality:

- ❑ It does help prevent cold shortening
- ❑ It also tenderises meat.
- ❑ Benjamin Franklin discovered electricity (lightning) made turkeys “uncommonly tender”
- ❑ (He also developed the lightning rod)
- ❑ Electricity on meat was predicted at the beginning of 20th century



What is electrical stimulation?

- ❑ A **pulsed electric current** through a carcass for a **defined time** after slaughter **accelerates rigor mortis**.
- ❑ Following *rigor mortis* meat cannot shorten and toughen and tenderising enzymes are protected and meat tenderises faster
- ❑ Electrical stimulation therefore is the single most important processing advance in the NZ industry
- ❑ There are over 100 different variations worldwide. Most claim either to be equivalent or better than the other!
 - ★ **An impossibility.**
- ❑ Too much stimulation has been blamed for toughness
 - ★ **Wrong!**
- ❑ Stimulation has been blamed for excessive drip
 - ★ **Wrong!**
- ❑ NZ exports \$5 billion dollars of meat based on this process that may be inconsistent and variable - quality and reputation suffers



❑ **We can do better than that!**

We control meat to understand stimulation and processing

- ❑ Wrapping excised muscle with a polyethylene film restrains it, and mimics muscle on a carcass
- ❑ We can control temperature and ageing accurately
- ❑ (Imagine accurately controlling several 300 kg sides of beef in a chiller with variable air flow!)
- ❑ We can move the meat into any environmental situation we want
- ❑ Cheap, simple technique used for hot boning. No need to stretch meat



We now know why is stimulation so effective?

Rigor mortis is the key!

- As electrical stimulation accelerates *rigor mortis*, meat is:
 - Protected against cold shortening and rigor toughening
- With stimulation and rapid *rigor* – **meat therefore reaches maximum tenderness**
- Without stimulation, high pre-rigor temperatures **reduce tenderness**
- **Temperature link** misapplied – so all advantages of stimulation not realised

Myth: Hot boned meat can't be as tender as cold boned meat

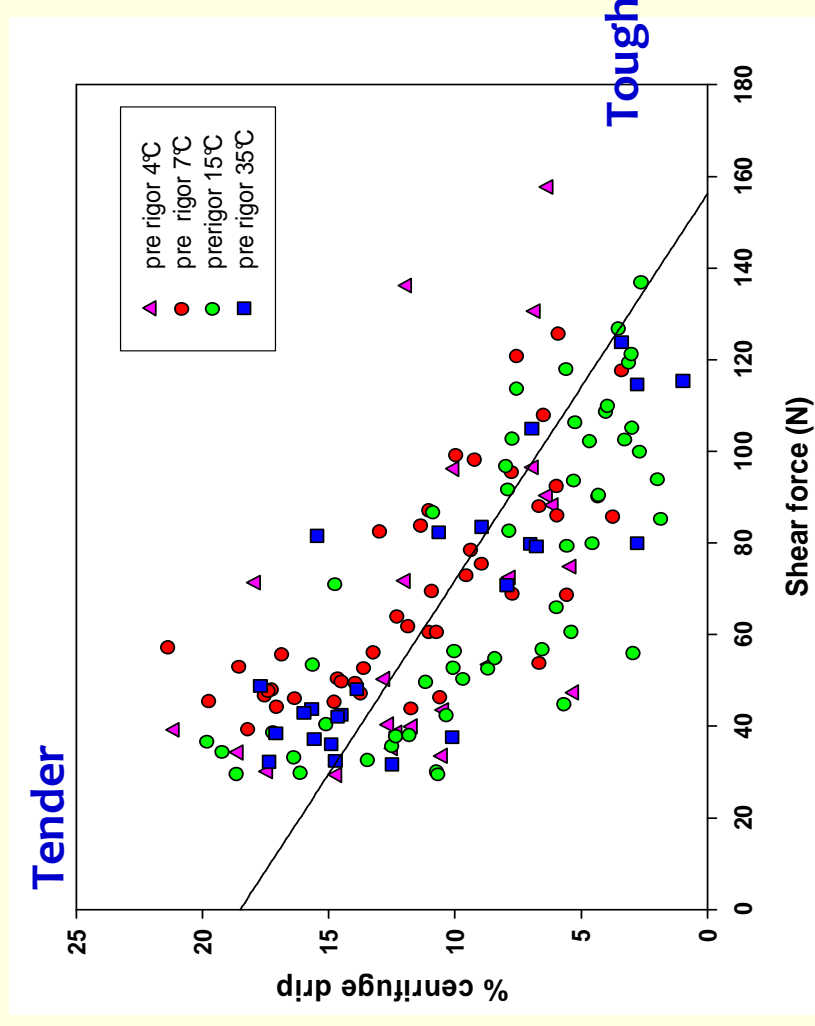
Reality:

- ❑ *If processing is bad, then cold boning is better than hot boning.*
- ❑ *With good processing (i.e. **stimulation** and **wrapping** of hot boned meat) the difference is negligible.*

Myth: Drip is a defect

Reality:

- ❑ Drip is not pretty, but it is not a defect
- ❑ Drip is a consequence of tenderisation
- ❑ Not due to high pre-rigor temperatures.
- ❑ Not due to electrical stimulation
- ❑ Fast tenderisation produces drip faster - no more drip for the **same** tenderness
- ❑ (Drip can be a defect in pork but happens for a different reason)



Myth: Vacuum packaged meat is more tender and besides our meat is tender anyway

Reality:

- ❑ Critical factors for ageing are time and temperature,
- ❑ The package is unimportant except for food safety and appearance
- ❑ We need to know more of this to **predict quality on early measurements so that meat is optimum at market** (more later)
- ❑ We don't know how tender our meat is as we rarely measure it? (10 samples per month is not really monitoring) – indeed if it is done
- ❑ There is a huge variation of tenderness within a single cut and between animals and with various processes - the variation decreases with aging