

Invasive Procedures in Cattle; A Review



Agriculture and
Agri-Food Canada

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Canada

Invasive Procedures

- Castration
 - Dehorning
 - Tail docking
 - Branding
-
- Public perception – Animal pain
 - Emotions vs scientific rationale
-
- Justifications –
 - Improve overall welfare of animal
 - Economic benefits outweigh welfare costs

Castration

- Knife
- Burdizzo
- Rubber band



Benefit ?

- Reduces aggressive and sexual behaviors
- Lowers quality grade
- Reduces meat tenderness, undesirable color; “Dark cutters”
- Penalty on sale

Research

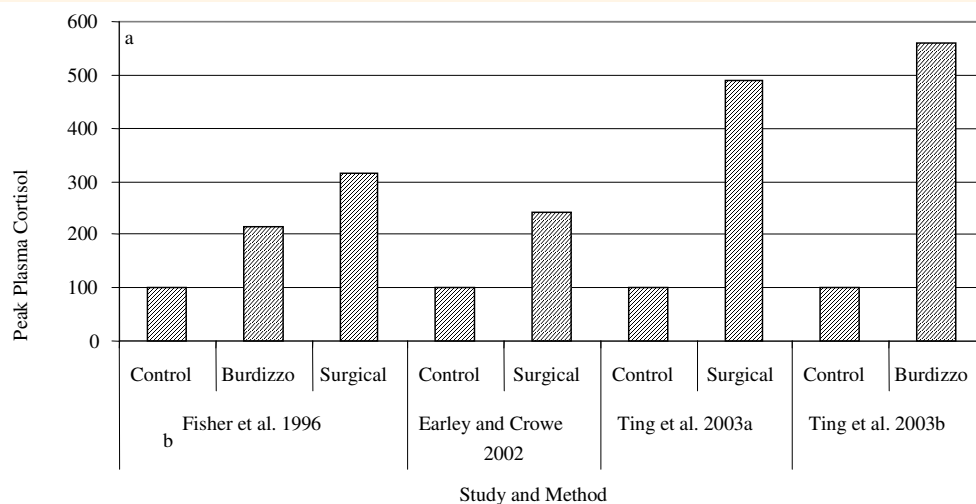
Plasma cortisol - (Johnston and Buckland, 1976; Macaulay and Friend, 1987; Cohen et al., 1990; Friend, 199; King et al., 1991; Mellor et al., 1991; Robertson et al., 1994 and Molony et al., 1995). **8**

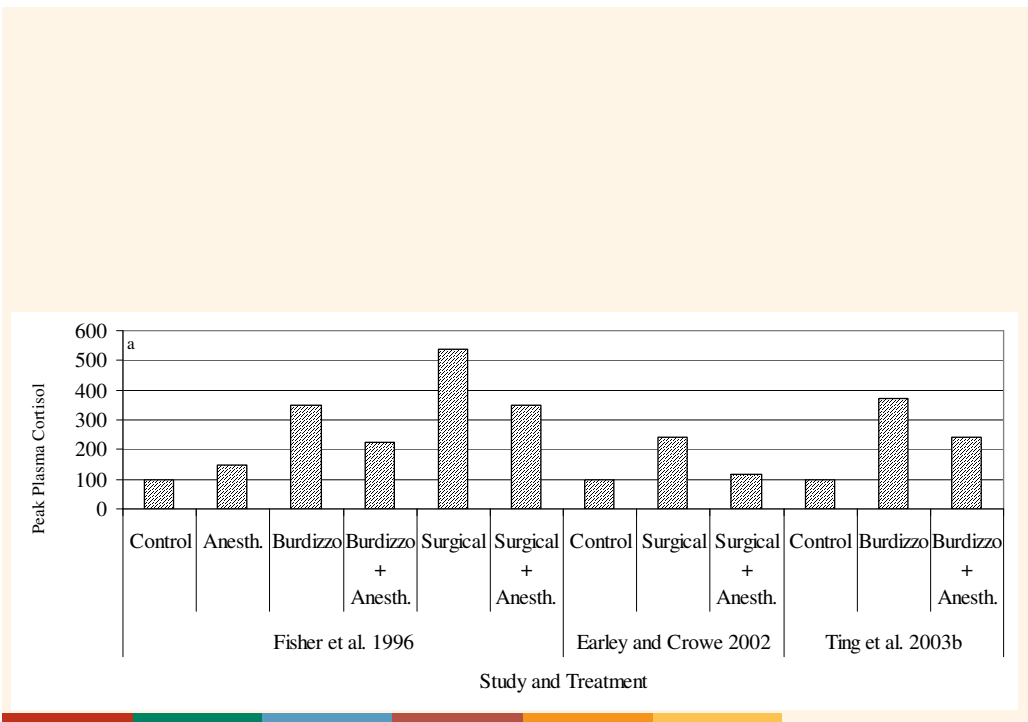
Salivary cortisol - (Fell et al., 1986).

Changes in WBC - (Macaulay et al., 1986; Macaulay and Friend, 1987). **2**

Changes in plasma thyroid hormones - (Macaulay and Friend, 1987; Puzder et al., 1991). **2**

Changes in behavior- (Fell et al., 1986; Macaulay et al., 1986; Macaulay and Friend, 1987; Mellor et al., 1991; Robertson et al., 1994 and Molony et al., 1995). **6**





Outcome

Calves castrated with Burdizzo castrator may suffer least in the first few hours after castration - (King et al., 1991; Robertson et al., 1994 and Molony et al., 1995).

Both Burdizzo and surgical castration caused less chronic pain than ring castration - (Molony et al., 1995).

Alternatives?

- Immuno-castration
Production of vaccine that targets the hormones responsible for testicular development and sperm production
- Don't castrate ?

Pain Management

- Do procedure before 8 week of age
- After 8 weeks use anesthetics
- Use of local anesthetic (Lidocaine)- (Fisher et al., 1996)
- Local anesthetic (Lidocaine + anti-inflammatory (Ketoprofen)- (Early and Crowe, 2002).

Dehorning

- Electric
- Scoop
- Cutters
- Wire
- Paste
- Cryosurgical

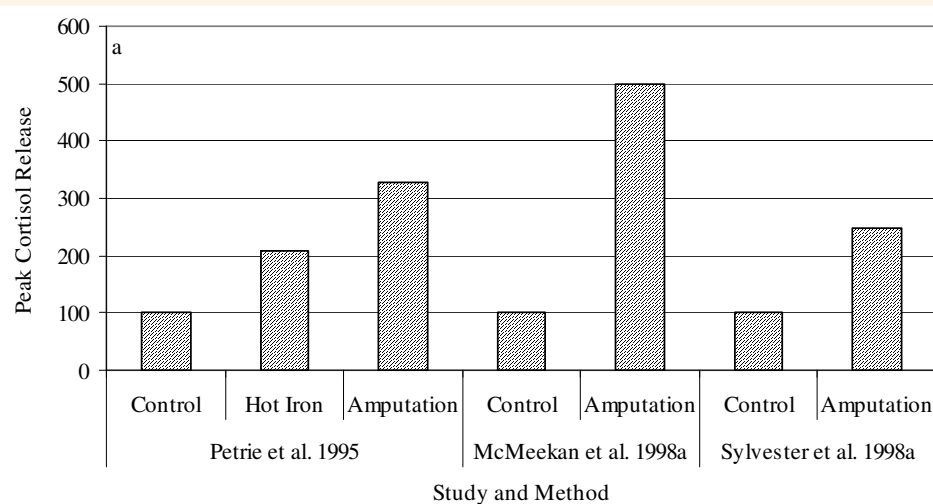


Benefit ?

- Reduce risk of injury
- Bruising
- Bunk space
- Penalty on sale

Research (Electric vs Scoop)

- **Cortisol** - (Laden et al., 1985; Boandl et al., 1999; Wohlt et al., 1994; Maier et al., 1994; Morisse et al., 1995; Taschke, 1995; Petrie et al., 1996; Sylvester et al., 1989; McMeekan et al., 1998a,b; McMeekan et al., 1999; Graf and Senn, 1999; Sutherland et al., 2002). **13**
- **Behavior** - (Lying standing, grazing, ruminating, tail shaking, ear flicking)- (Morisse et al., 1995; Taschke, 1995; Graf and Senn, 1999; Faulkner and Weary, 2000). **4**



Outcome

- Caustic paste, cutters and wire more painful than hot-iron
- Anesthetics reduces the immediate cortisol response
- Cautery and local anesthetic following scoop dehorning reduced cortisol response
- Anesthetic delay response?
- Behavioural response was more pronounced after anesthetic wears off? (5 studies)

Polled Gene Alternative?

Cows

- Pregnancy
- Calving and weaning rates
- Calf birth and weaning weight
- Calf pre-weaning ADG
- Dystocia score
- Cow weights and condition score

Bulls

- ADG
- Weight per day of age
- Scrotal circumference

(Stookey & Goonewardene, 1996;
Goonewardene et al., 1999)

Pain Management

- Local anesthetic (Lidocaine; Bupivacaine)- (Petrie et al., 1995; McKeenan., 1998a,b).
- Local + Anti-inflammatory analgesic (Ketoprofen)- (Sutherland et al., 2002; Falkner and Weary., 2000; McKeenan et al., 1999).
- Local + wound cautery (Sylvester et al., 1998; Sutherland et al., 2002).



Tail Docking

- Rubber band



Benefit ?

- Udder cleanliness
- Reduced disease trans.
- Milker Comfort



Research

- Behavior (lying, walking, tail shaking, foot stomps, tail swings) — (Eicher and Dailey, 2002; Schreiner and Ruegg, 2002a). **2**
- Physiology (cortisol, hematology, heart rate, body temp., acute phase proteins) — (Eicher et al., 2000 ;Eicher et al., 2001; Eicher and Dailey, 2002; Schreiner and Ruegg, 2002a). **4**
- Cleanliness (leg and udder) — (Eicher et al, 2001; Tucker et al., 2001; Schreiner and Ruegg, 2002b). **3**

Research

- Health (somatic cell count, mastitis) - (Schreiner and Ruegg, 2002a; Tucker et al., 2001; Matthews et al., Pouge et al.,). **4**
- Fly problems (counts, avoidance) - (Eicher and Dailey, 2002; Eicher et al, 2001, Matthews et al.; Pouge et al.,). **4**
- Production (milk yield and quality, intake) - (Tom et al., 2002; Schreiner and Ruegg, 2002b). **2**

Outcome

- Tucker et al. No cleanliness or udder health benefits
- Tom et al. Few signs of pain, increased fly avoidance
- Matthews et al. No diff. in milk yield or SSC, more fly avoidance for D cows
- Eicher et al. Measures of pain variable, D cows show greater fly avoidance

Alternatives?

- Don't do it
- Remove switch only

Branding

- Hot-iron
- Freeze





Concerns for Beef Industry

Dehorning	4/5
Castration	3
Hot-iron branding	9/10
Use of whips prods	6/7
Humane transportation	8/9/10
Live animal exports	4/5

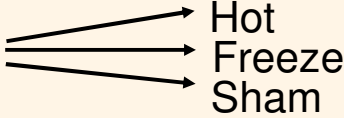
CCA, 1999



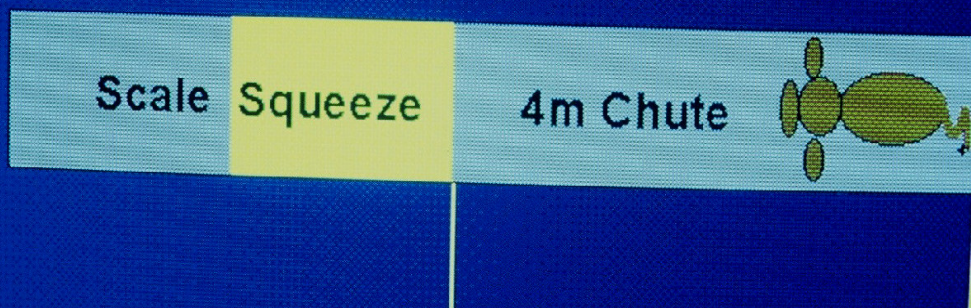
Research

- 5 studies
- Total of 950 steer and heifers

How does branding affect cattle performance?

- 300 steers 
 - Hot
 - Freeze
 - Sham
- Weight gain and RT (10d)
Handling ease
- 2 days after arrival combined with processing
- 20 days after arrival

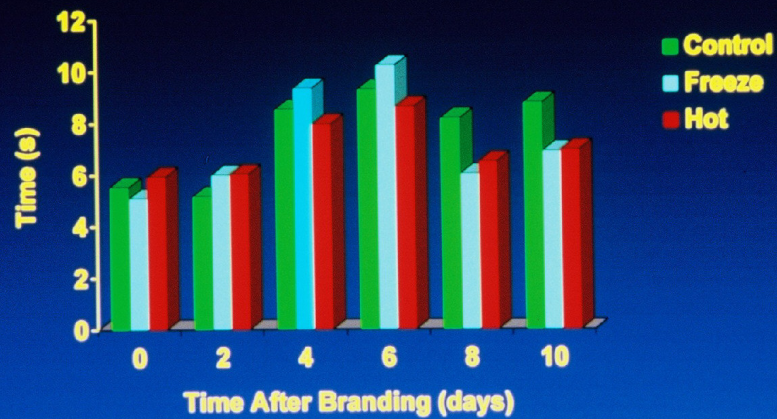
Handling Ease Measurement



Results

- No difference in ADG over 10 d
- No difference in # sick
- No difference in RT
- No difference in handling ease

Handling-ease



Is branding painful?
If yes then which one is more?

- 3 studies
 - physiology and behaviour

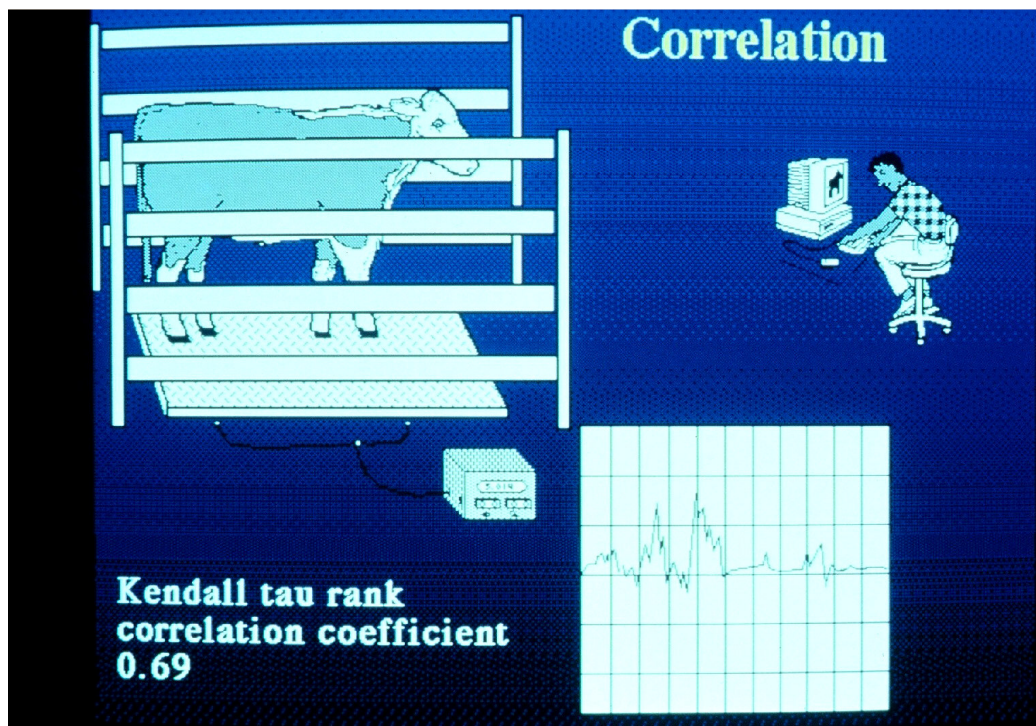
Stress and Pain

- 30 heifers
 - Cortisol
 - SIA
 - Pressure test



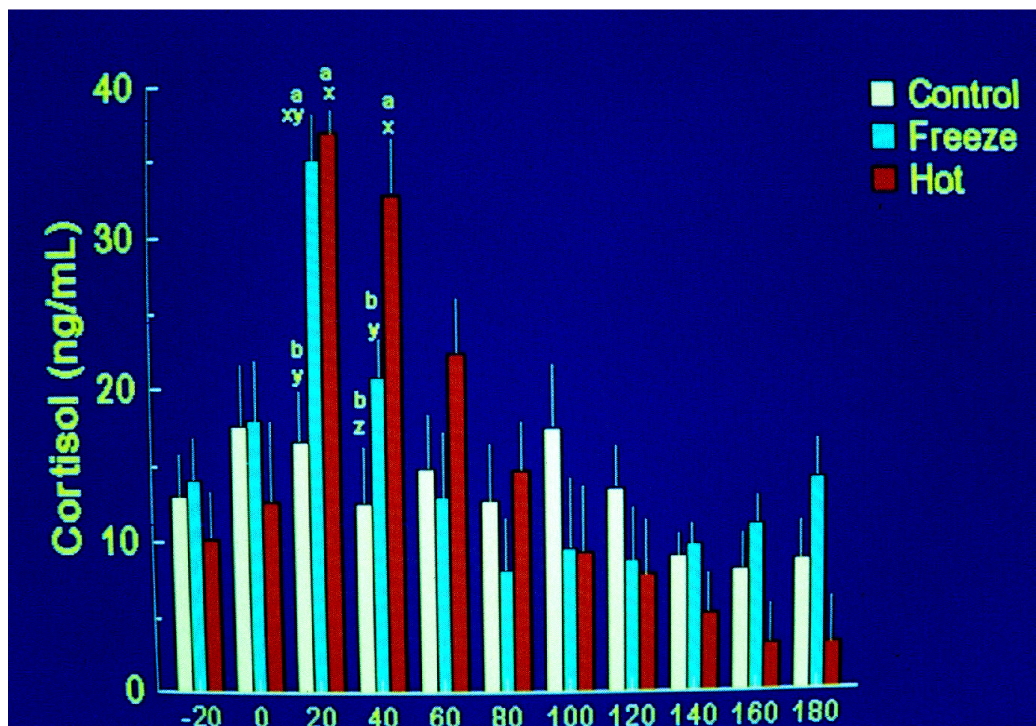
Stress Induced Analgesia





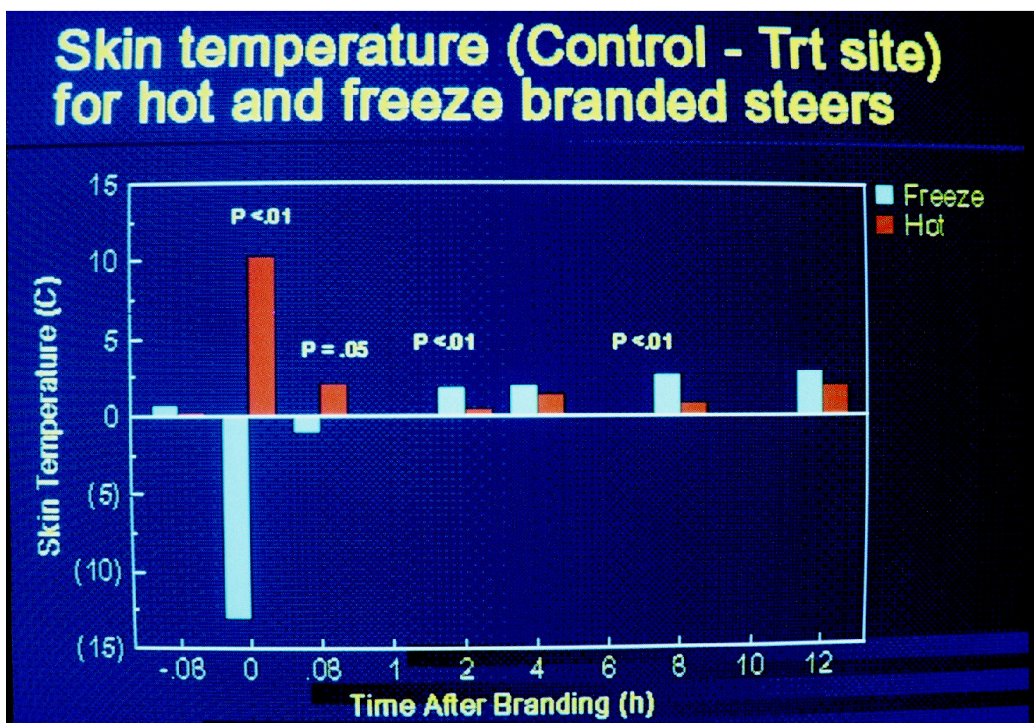
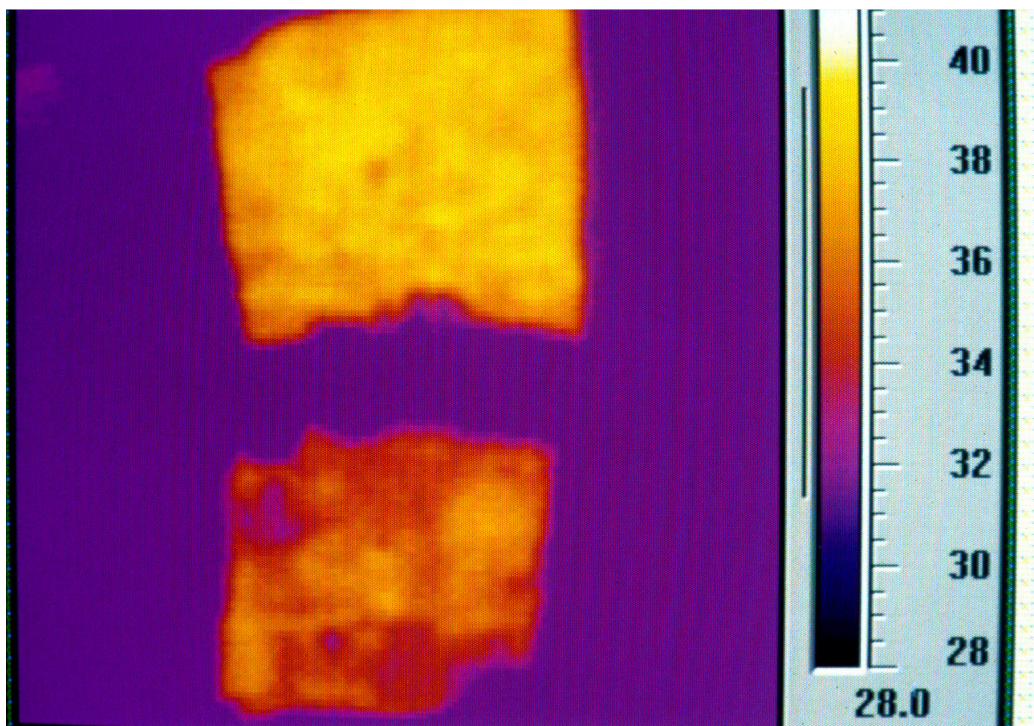
Results

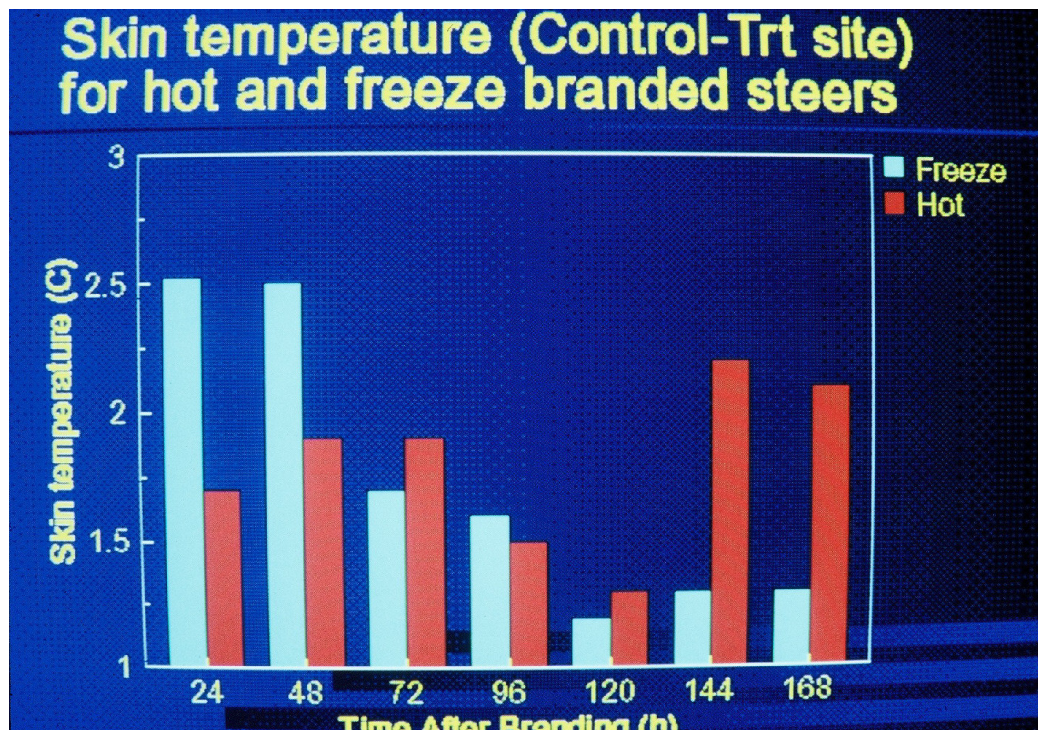
- No difference in foot lift latency
- No difference in pressure test



Inflammation

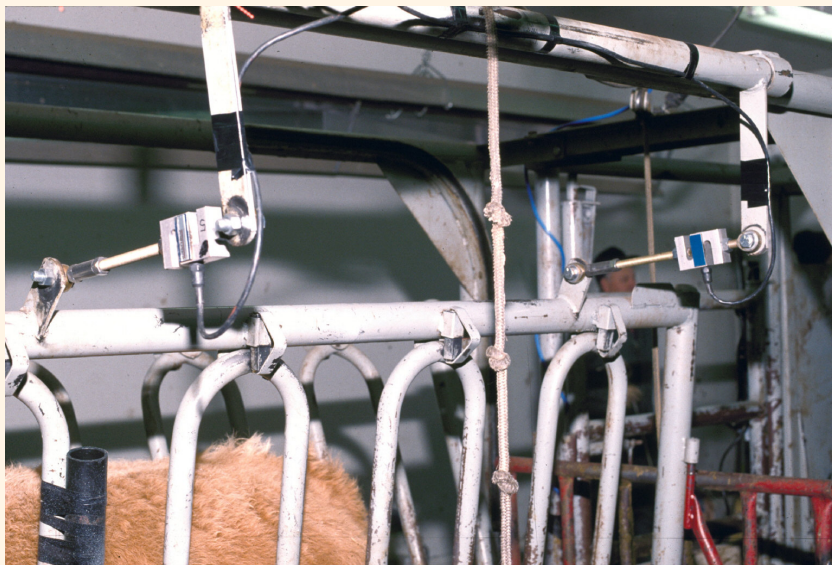
- 30 heifers
 - Use of Infrared thermography to detect differences in skin surface temperature
 - 12 hours after branding
 - daily for 1 week

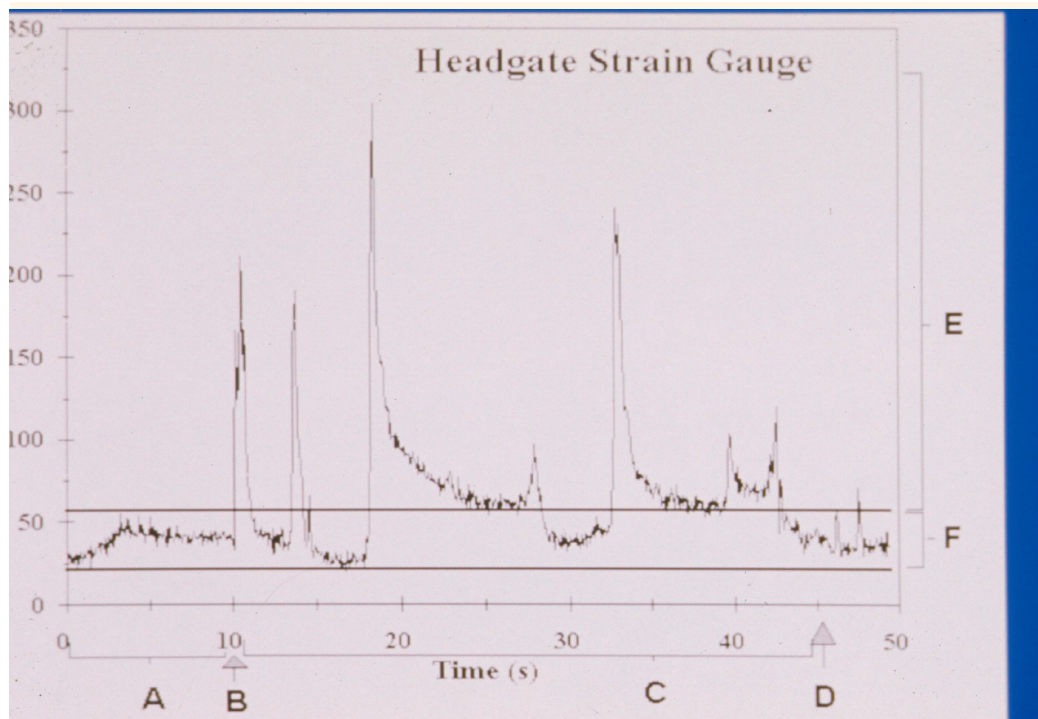




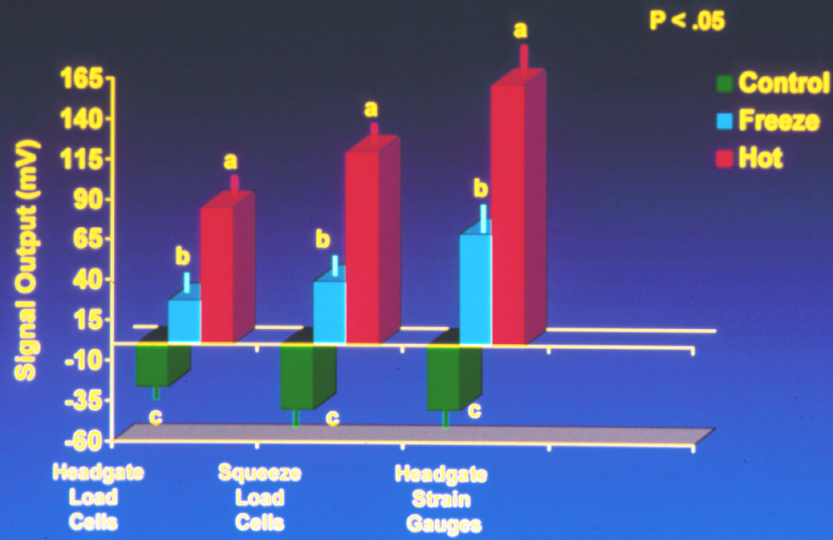
Behavioural Response

- 300 steers
- Amount and velocity of head movement
- escape response - force
- kick, vocalize, fall in chute, tail-flick

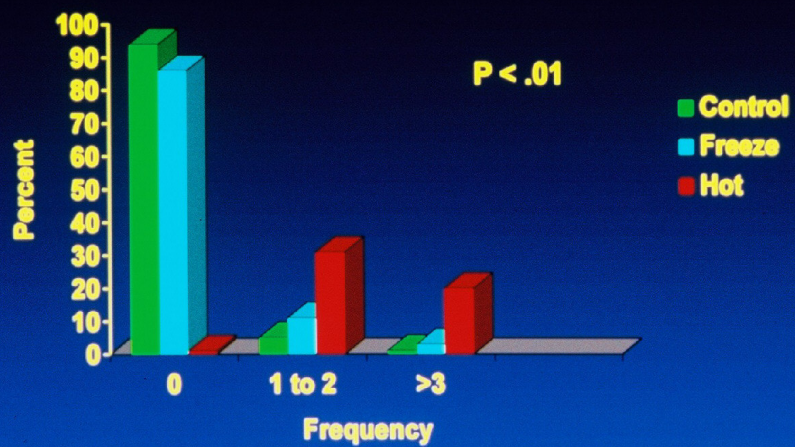




Maximum Force



Kick

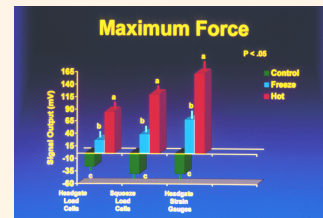
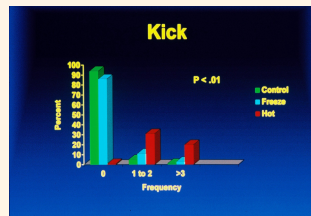
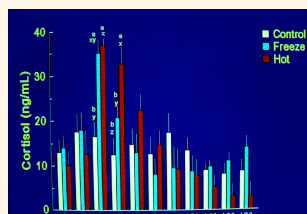


How Painful Is Branding?

- Short term pain experienced by H and F branding
- Not enough stress to reduce performance

Which method causes least pain?

- Freeze branding less painful than H branding at time of application

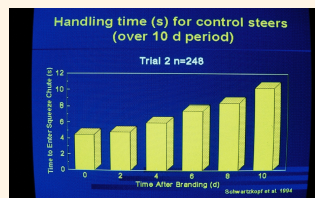


Recommendation ?

- Freeze
 - **However**
 - small difference
 - extra time, cost, coolant availability, inconsistency of freeze mark produced

Reducing and eliminating stress

- Improve handling and adhere to proper technique
- Other identification methods



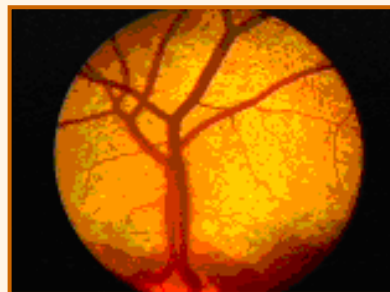
Alternatives?



- Don't Brand
- Electronic Identification?
- Others?

Alternatives?

- Don't Brand
- Electronic Identification?
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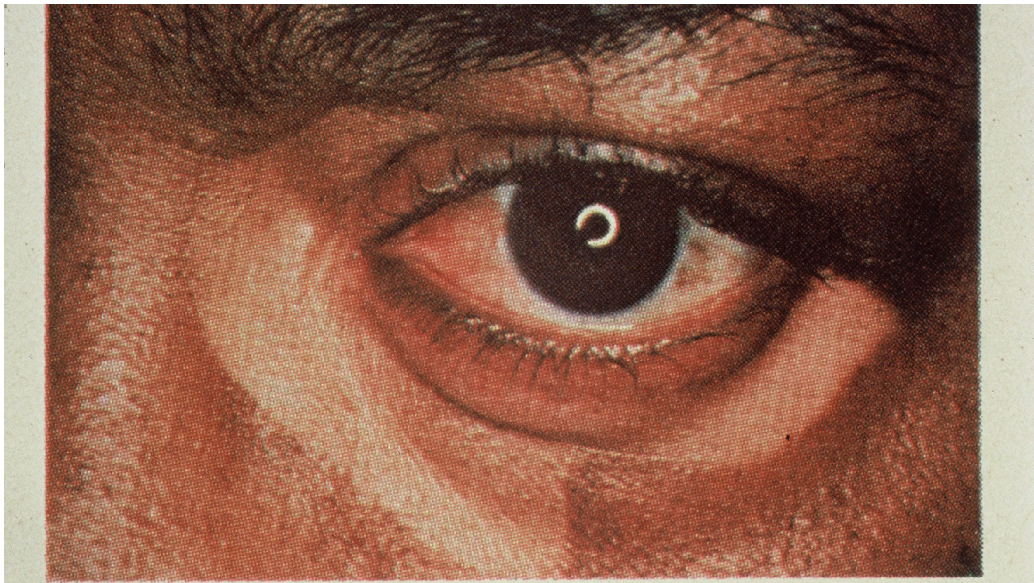


Fig 1.—Sharply demarcated area of depigmentation involves left periorbital skin.







Overall Conclusions

- Develop alternatives
- Where alternatives not possible use pain management
- Must be more than a short term solution

Pain identification -

“If we cannot assess pain then we cannot manage it”

Conclusions

- Effective pain relief and dosage requirements
- Drug residues and withdrawal times

