

rBST use: consequences for animal health and consumer safety

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Food Animal Biotechnology



Perceived welfare issue

- ❖ BST: a distressing product
 - CWF analysis by Joyce D'Silva
- ❖ BST is a cynical abuse of both the dairy cow and the dairy farmer
 - Prof John Webster, Bristol Univ. Vet. School

Metabolism in context

- ❖ Maternal investment theory predicts that the cow will invest heavily in lactation
- ❖ Example: dual purpose (suckled/ milked) cows losing 10kg bw/wk in early lactation, 0.94 BCS units loss
- ❖ Problems result from imbalance between energy in and energy out
- ❖ Over-condition is a bigger problem than under-condition for the down-calving cow

Metabolic effects of BST

- ❖ 0.2 BCS units loss in entire lactation
- ❖ The milk yield response is comparable to thrice-daily milking
- ❖ The milk yield response is sub-maximal
- ❖ The cow retains control

Metabolic effects of BST

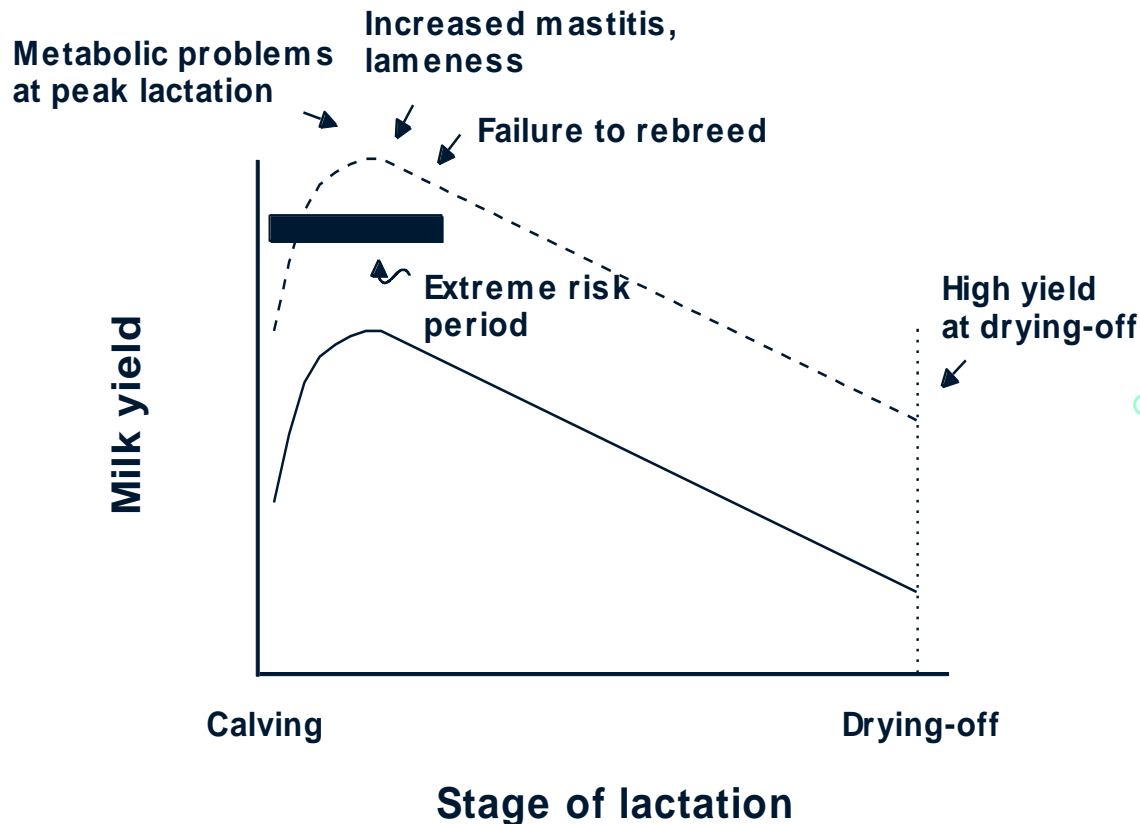
- ❖ The response does not differ between high and low genetic merit cows
- ❖ The age structure of herds and underlying yield trends are unaffected
- ❖ Metabolic disease is reduced

Conclusions on metabolic effects

- ❖ Effects are modest
- ❖ Effects are in line with the cow's own objectives and teleological priorities
- ❖ BST is acceptable on purely metabolic grounds

Cow health in context

Danger Zone



- 60% of vet costs are incurred in the first 45d of lactation
- Problems tend to be greater in high merit cows

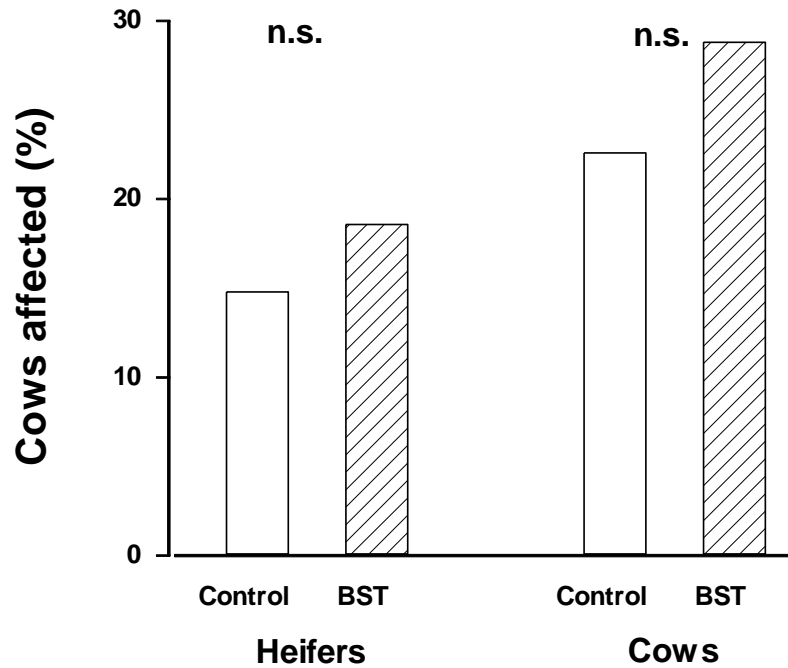
BST and cow health: who should we believe?

- ❖ 25% (or 10%) increase in mastitis risk
 - CVMA Expert Panel Report, 1999
- ❖ No difference in mastitis
 - Judge *et al* 1997, J. Dairy Sci. 80, 3212
- ❖ 50% increase in lameness risk
 - CVMA Expert Panel Report, 1999
- ❖ No difference in lameness
 - Wells *et al*, 1995, 56, 992

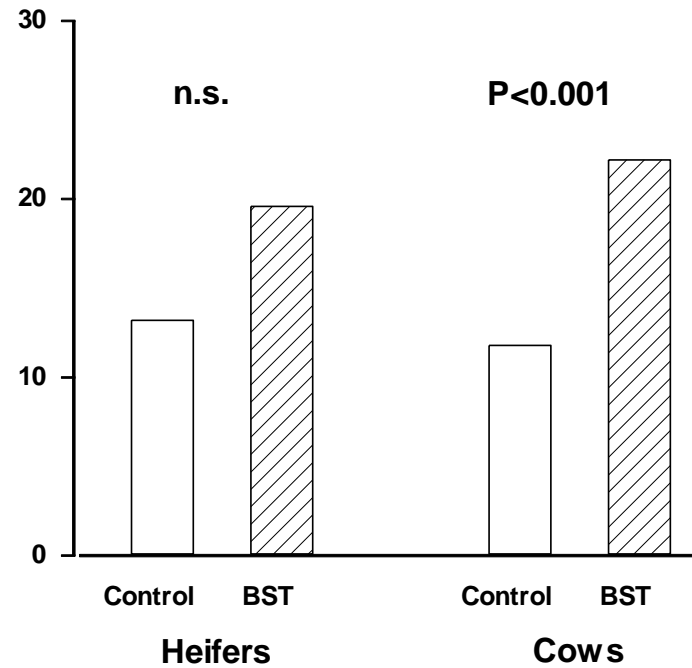
BST and cow health

- ❖ A postapproval monitoring programme was undertaken following licensing
- ❖ This reported in 2001:
 - Collier et al (2001) J. Dairy Sci. 84 1098-1108
- ❖ No effect on reproduction, mastitis, digestive disorders, culling
- ❖ Increased use of medications
- ❖ Increased lameness

Incidence of mastitis and lameness



Mastitis



Lameness

Conclusions on cow health

- ❖ Injection site reactions are unacceptable
- ❖ BST is associated with a small but measurable increase in disease incidence
- ❖ Cause and effect has not been established
- ❖ Irrespective of the degree and mechanism, this is unacceptable...
- ❖ ...as is continuous genetic improvement with no regard to better practice

Safety in context

- ❖ Milk contains many steroid and protein hormones and peptide growth factors
- ❖ In general, steroids will be absorbed intact, proteins will not, peptides may be
- ❖ BST and IGFs are the most pertinent
- ❖ rBST and BST differ by 1 amino acid
- ❖ hGH and bST are very different
- ❖ Human and bovine IGF1 are identical
- ❖ Serum IGF1 is implicated as a risk factor in breast, colon, lung and prostate cancer

BST and safety

- ❖ Milk concentration of BST is 1-4ng/ml and is not increased by treatment
- ❖ 90% of BST is destroyed by pasteurisation
- ❖ BST is not biologically active in humans
- ❖ Digested fragments of BST are also biologically inactive
- ❖ Immunologically no different to many food proteins

IGF1 and safety

- ❖ IGF1 in cow's milk: 1-10ng/ml
- ❖ Reported increases due to BST treatment range from nil to 5 fold (mostly <2 fold)
- ❖ 1 litre/d of BST milk could contribute up to 13% of total gut IGF1 and up to 0.1% of serum IGF1
- ❖ There is no evidence for any increase in serum IGF1 after oral dosing
- ❖ Human milk contains more IGF1 than cow's

Other safety issues

- ❖ Antibiotic residues: no effect
- ❖ BST/IGFs in meat: no effect
- ❖ Retroviruses: no effect
- ❖ Prion proteins: unknown
- ❖ Infant diabetes: link with cow's milk is not related to BST or IGF1

Conclusions on safety

- ❖ "The (WHO) Committee concluded that BST can be used without any appreciable risk to the health of consumers"
- ❖ "The (WHO) Committee reaffirmed its previous ADIs and MRLs 'not specified'"
- ❖ nb: "Not specified" is granted only to products with a wide safety margin