Commercial Poultry Production: Is there a Welfare Problem?

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Welfare Problems in Commercial Poultry Production

- There ***are*** welfare problems
- They are many and varied
- At last, they have been acknowledged to exist
- There is a fairly big research effort in Canada to find solutions
- I am confident that solutions will be found

Welfare Problems in Commercial Poultry Production

1. Appropriateness of environment
2. Beak trimming (and other mutilations)
3. Disposal of spent laying hens
4. Fast growth problems in meat birds
5. Feed restriction in broiler breeders
6. Hyper-aggressiveness in broiler breeders
7. Transportation and slaughter

Domestic Fowl

Modern domestic fowl descended mainly from Burmese Red Junglefowl

Myanmar (Burma)

Tropic of Cancer

Approx. range of Burmese Red Junglefowl

Chickens are derived from a sub-tropical species

12° N

Modern chicken is very different

Junglefowl	Domestic Fowl
12-14 eggs/year	Layer 320 eggs/year
Grows to 600-800 g in a year	Broiler grows to 2 kg in 38 days

Domestic Fowl

Almost like two species

Layer strains **Broilers**

Different husbandry systems

Different disease risks

Different welfare problems

Animal Welfare

Animal welfare is all to do with what animals feel:

With negative feelings we call “suffering”

With positive feelings we call “pleasure”

Animal Welfare

Now lots of evidence that chickens are sentient (i.e. they have feelings). They can experience:

NEGATIVE	POSITIVE
pain/discomfort	contentment
frustration/deprivation	pleasure
fear	
malaise	
social stress	
~~maternal separation~~	

Is there a welfare problem?

1. **Appropriateness of environment**

Battery cages

Laying hens

>90% of layers kept in battery cages

Laying hens

>90% of layers kept in battery cages

Welfare Advantages of Battery Cages

Hygienic

Benefit of reduced disease:

- **Coccidiosis (*Eimeria* spp.) ⬇**
- **Intestinal worm infestations ⬇**
- **Pullorum disease (*S. pullorum*) ⬇**
- **Fowl typhoid (*S. gallinarum*) ⬇**
- **Avian tuberculosis (*Mycobacterium tuberculosis avium*) ⬇**

Welfare Advantages of Battery Cages

Hygienic

- **The biggest advantage of cages (all previously mentioned diseases especially Coccidiosis are controlled).**
- **It is an *important* advantage (public increasingly concerned about drug residues).**
- **External parasites much less of a problem in cages (especially Red mite).**

Welfare Advantages of Battery Cages

Small Group Size

- Cage group size (4-6 hens) much closer to natural flock size of Jungle fowl than a system that has 100s or 1000s of hens in one group.
- Hens prefer to be in smaller groups.
- Small group size reduces social friction.

Welfare Advantages of Battery Cages

LOWER incidence of feather-pecking and cannibalism

- **Many people find this hard to accept. Nevertheless it is true.**
- **It has to do with the transmission of this behaviour.**
- **Primary peckers are divided up and largely isolated. The behaviour does not spread through the flock.**

Welfare Advantages of Battery Cages

Better air quality in barn

- The presence of litter can give rise to high dust and ammonia levels
- Cages eliminate litter and so air quality is enhanced

Other Advantages of Battery Cages

- **All eggs are collected**
- **Cages are easy to manage**
- ***Everything* can be automated, therefore very labour-saving**

Advantages of Battery Cages

- Hygienic*
- Small group size*
- Lower incidence of feather-pecking and cannibalism*
- Better air quality in barn*
- All eggs are collected
- Easier to manage
- Labour-saving

* welfare advantage

Welfare Problems of Battery Cages

Frustration of Nesting Behaviour

Frustration of Nesting Behaviour

Most caged hens show symptoms of frustration 1-1½ hours before the egg is due to be laid:

- **Stereotyped back-and-forward pacing**
- **Increased aggression**
- **Displacement preening**

Frustration of Nesting Behaviour

+80% of light hybrid strains (Leghorns) show frustrated nesting in cages,

and a slightly lower percentage of medium hybrid strains (Brown egg layers)

No change in incidence between 1972 and 2003.

Frustration of Nesting Behaviour

Hens show symptoms of severe frustration for 1 - 1½ hours* before laying (7 days out of 8)…

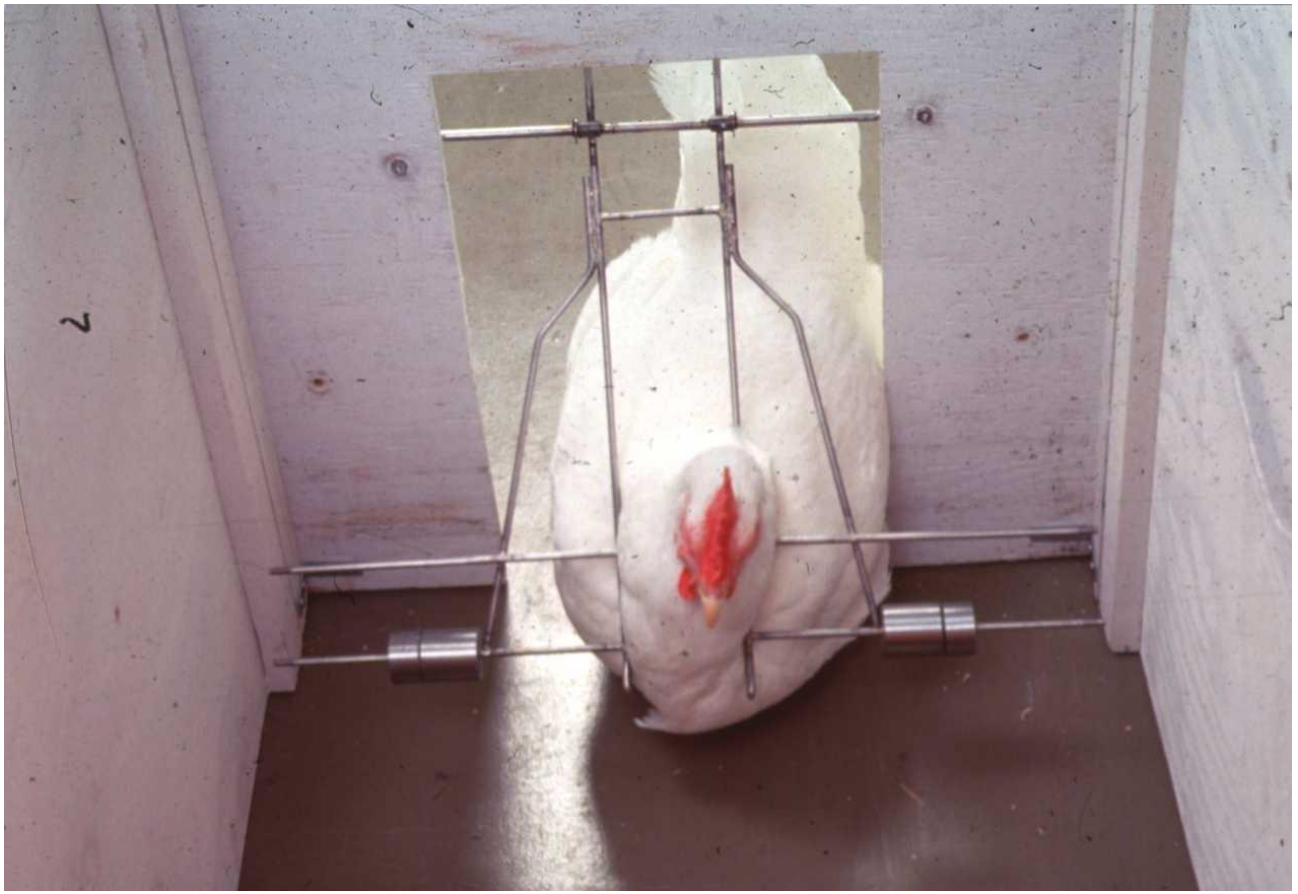
…and we can ask them how important having a nest site is.

*** 1 - 1½ hours is an underestimate**

Frustration of Nesting Behaviour

They will run down a runway very quickly to reach a nest site.

Frustration of Nesting Behaviour



They will work very hard to reach a nest site.

Frustration of Nesting Behaviour

Nesting behaviour is EXTREMELY important to hens.

Welfare Problems of Battery Cages

Lack of Social Space

Hens do not arrange themselves at random in the available space.

There are psychological forces that keep them apart – they do not like to be crowded together.

If given lots of room, there are also forces that pull them together (they are a flocking species).

Lack of Social Space

At usual cage space allowance, hens try to space themselves out as much as possible.

Suggests that commercial stocking densities are far too tight.

Keeling and Duncan (1989)

Welfare Problems of Battery Cages

Lack of Physical Space

Many activities and postures are affected by the physical space available in a battery cage.

Lack of Physical Space

Normal height of battery cages does not allow hens to adopt the common 'standing alert' posture.

Dawkins (1985)

At normal battery cage height:

- **Head stretching ⬇**
- **Head scratching ⬇**
- **Body shaking ⬇**
- **Length of time sitting ⬇**

Nicol (1987)

Lack of Physical Space

At normal battery cage area:

- **Head scratching ⬇**
- **Body shaking ⬇**
- **Feather raising ⬇**
- **Cage pecking ⬆**

Nicol (1987)

Results suggest that the normal dimensions of battery cage may compromise welfare by restricting hens' behavioural repertoire.

Lack of Physical Space

We can also ‘ask’ hens how much space they prefer.

Hens prefer more space than that available in conventional battery cage.

Hughes (1975); Dawkins (1981)

Welfare Problems of Battery Cages

Lack of Roosting Opportunities

Lack of Roosting Opportunities

The normal roosting posture – the natural posture for sleeping and resting

Lack of Roosting Opportunities

But hens CAN adapt to other postures for sleeping and resting.

So do cages reduce welfare through denying hens normal roosting?

Hens, used to roosting on perches high off the ground showed symptoms of frustration when prevented.

AND worked hard to gain access to perches.

Olsson and Keeling (2000, 2002)

Welfare Problems of Battery Cages

Lack of Foraging Opportunities

Junglefowl and feral domestic fowl spend 60-70% of their day foraging.

Although hens in battery cages have food in front of them continuously, and can CONSUME food, many of the APPETITIVE elements of feeding are restricted.

Lack of Foraging Opportunities

Hens in battery cages cannot perform:

- **Locomotion**
- **Ground scratching and pecking**
- **Probing and flicking**
- **Tearing leafy material**

And the body posture while feeding in a cage is different from that when foraging in a more extensive environment.

Welfare Problems of Battery Cages

Lack of Dust-Bathing Opportunities

Dust-bathing functions to remove stale oil from the feathers.

However, it is not a build-up of stale oil that triggers dust-bathing, but a combination of other factors.

If these factors are absent, dust-bathing will not be triggered.

Duncan *et al.* (1998)

Lack of Dust-Bathing Opportunities

So lack of dust-bathing does not necessarily reduce welfare.

However, there is evidence that performing dust-bathing may lead to PLEASURE.

Widowski and Duncan (2000)

In assessing the overall quality of life that hens have, experiencing some pleasure may be important.

Welfare Problems of Battery Cages

Lack of Exercise

Being housed in battery cages means that hens do not get sufficient exercise to maintain bone strength:

- **Risk of ‘Cage Layer Fatigue’**
- **Osteoporosis and bone weakness in ‘spent hens’**

Lack of Exercise

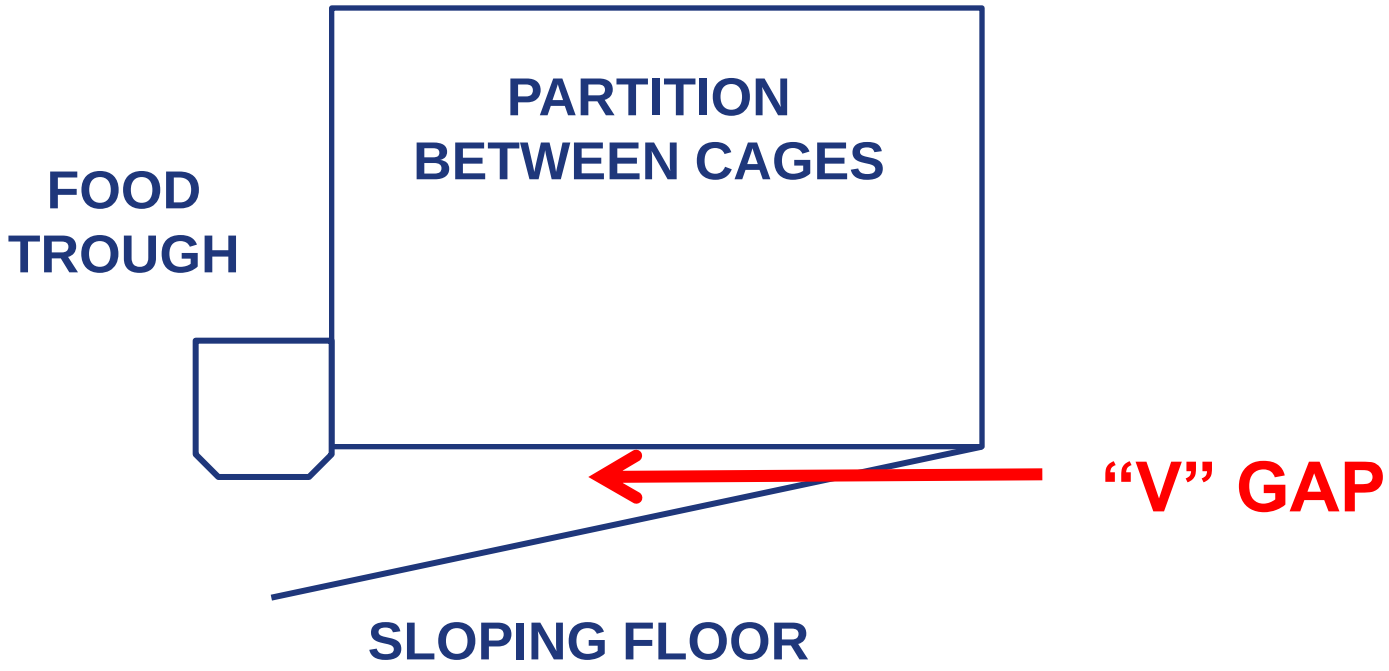
Spent hens ‘suffering’ from osteoporosis have a terrible price to pay:

- **Weak bones**
- **Carcases worth very little**
- **Cages not designed for de-population**

This combination leads to high risk of broken bones and other injuries.

Welfare Problems of Battery Cages

Hens can get trapped and injured



Welfare Problems of Battery Cages

Lack of Inspection

Assume 10,000 laying hens with 5 birds per cage = 2,000 cages.

Assume all tiers can be seen adequately from the walkway.

Assume 4 seconds inspection of each cage = 8,000 seconds = 133 minutes =

2 hours 13 minutes

Lack of Inspection

“The Sniff Test”

There must be a dead bird near here!

Battery Cages

Welfare Pros	Welfare Cons
Hygienic	Frustrated nesting
Small group size	Lack of social space
Less feather-pecking	Lack of physical space
Better air quality	Lack of roosting
	Lack of foraging
	Lack of dust-bathing
	Lack of exercise
	Lack of inspection

Battery Cages

I would argue, and society would argue, that the Welfare Cons of cages heavily outweigh the Welfare Pros

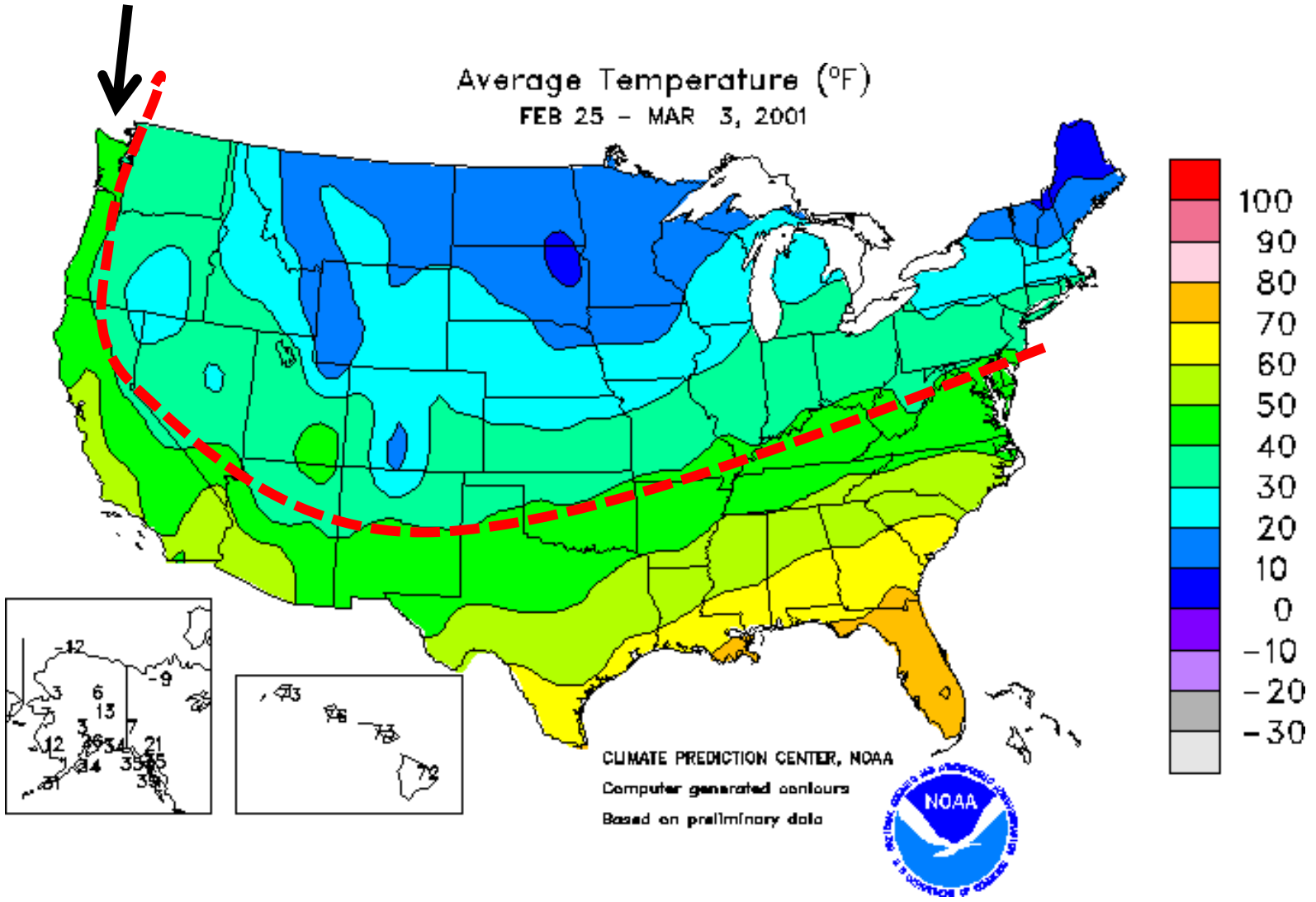
Alternatives to cages

- **Free Range – means access to outside. Where climate permits, offers much more behavioural freedom, but there are other welfare risks.**
- **Free Run – means cage-free within a barn; there are many variations. Some offer welfare advantages, others do not.**
- **Furnished cages – many variations. Some offer welfare advantages, others do not.**

Free Range

Free Range

Free range only possible in southern tip of B.C.



Advantages of Free Range

- Almost complete behavioural freedom
- Nesting allowed
- Foraging allowed
- Perching and roosting allowed
- Spacing allowed according to activity
- Birds can choose micro-climate

Disadvantages of Free Range

- Birds exposed to weather extremes
- Birds exposed to predators
- Risk of internal parasites especially Coccidia
- Risk of external parasites especially Red mite
- Risk of feather-pecking and cannibalism

Free Run

Advantages of Free Run

- **Some behavioural freedom**
- **Nesting allowed**
- **Perching and roosting allowed**
- **More space than battery cages (but still may be crowded)**
- **Foraging *may* be allowed**
- **Dust-bathing *may* be allowed**

Advantages of Free Run

Nesting allowed

Advantages of Free Run

Perching and roosting allowed

Advantages of Free Run

Foraging may be allowed

Disadvantages of Free Run

- If deep litter area is included, ammonia and dust may be a problem
- Group size may be huge
- Risk of external parasites
- All-slatted floor (to improve air quality) prevents foraging
- All-slatted floor prevents dust-bathing
- Risk of feather-pecking and cannibalism

Disadvantages of Free Run

All slatted floor prevents foraging and dust-bathing

Furnished Cages

Commercial Swedish Cage for 20 hens

Furnished Cages

Commercial Swedish Cage for 40-44 hens

Furnished Cages

Commercial Swedish Cage for 8 hens

Furnished Cages

I have been extremely disappointed in the standard of furnished cages being introduced to North America.

“How little can we get away with?”

Advantages of Furnished Cages

- Hygienic
- Nesting allowed
- Perching and roosting allowed?
- Dust-bathing allowed?
- Small group size
- A little more space than conventional cages

Disadvantages of Furnished Cages

- Foraging is prevented/difficult
- Dust-bathing is prevented/difficult
- Space limited
- Roosting may not be adequate

THEY WILL STILL BE SEEN AS CAGES!

2. Beak trimming

Feather pecking and cannibalism are long-standing welfare problems

- **Reduce welfare considerably by causing injury and pain**
- **Complex etiology – but with an obvious genetic component**
- **Simple solution – beak trim**

Beak trimming

THE PROBLEM

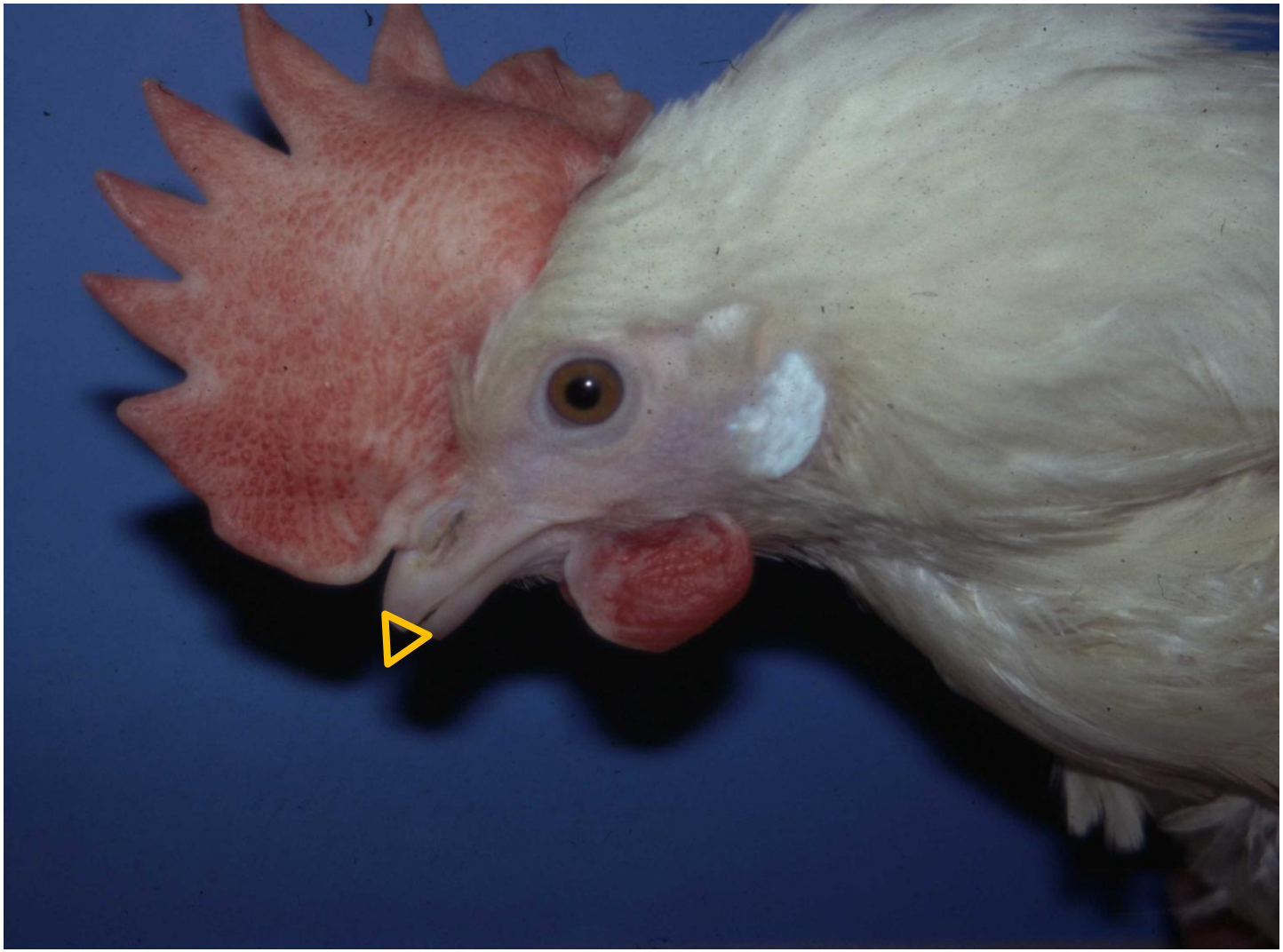
Beak trimming

THE SOLUTION

Beak trimming

THE SOLUTION

Beak trimming



THE SOLUTION

Beak trimming

But, the tip of a chicken's beak is very well supplied with nerves.

In a series of experiments, growing birds (6 weeks old) were beak trimmed using a hot-blade de-beaker.

(Breward, Gentle & Duncan)

Short-term results

All the evidence suggested immediate acute pain at the time of the procedure

Long-term results

1. Neuroma formation
2. Spontaneous discharges in the intramandibular nerve
3. Subtle behavioural changes suggestive of chronic pain

Beak trimming

All these results suggest both acute and chronic pain.

However, precision beak-trimming in the hatchery using an infra-red beam causes much less pain (and probably no chronic pain).

BUT……

Beak trimming

There is a danger.

Infra-red beak trimming may not continue to be effective, if steps are not taken to select against feather pecking genetically.

Beak trimming

- **Feather pecking and cannibalism cannot be controlled completely by environmental manipulation** (Appleby et al., 1992)
- **Possible to select against them using a kin selection procedure** (Muir and Craig, 1998)
- **Beak trimming may be banned**

Primary Breeding Companies must be persuaded to select against feather pecking and cannibalism in their breeding programs.

Other elective surgeries

- Dubbing broiler breeder male combs
- De-snooding turkeys
- De-toeing broiler breeder males (inside toe and back toe)
- De-toeing growing turkeys (outside toe)

At the very least, these procedures cause acute pain and there may well be other costs (interference with individual recognition, difficulty balancing).

Other elective surgeries

The general public will eventually object to cutting off body parts!

3. Disposal of spent laying hens

A huge problem!

In a U.K. survey, 30% of hens had broken bones at processing plant before they were stunned.

- **Weak skeleton depleted of calcium exacerbated by lack of exercise**
- **Poorly designed cages**
- **Carcasses worth nothing**

Disposal of spent laying hens

Intractable problem.

Suggested solutions :

- **On-farm slaughter - gassing or maceration**
- **Include cost of humane disposal in price of eggs**

Disposal of spent laying hens

Gassing system developed in Ontario

Disposal of spent laying hens

Trolleys are loaded on to a trailer with a lift

Disposal of spent laying hens

Trolleys are loaded on to a trailer with a lift

Disposal of spent laying hens

Trolleys wheeled to front of trailer where there is a gas chamber

Disposal of spent laying hens

Gas chamber is filled with carbon dioxide from a tanker truck.

All birds dead within 5 minutes.

Trolleys are wheeled out.

Carcasses are tipped out via “bomb doors”.

Disposal of spent laying hens

Carcasses tipped out via “bomb doors” on the trolleys

Disposal of spent laying hens

Carcasses mixed with wood shavings or straw and composted

Disposal of spent laying hens

Carcasses mixed with wood shavings or straw and composted

Disposal of spent laying hens

Composting outside

Composting inside

4. Fast growth problems

Metabolic disease now bigger problem in poultry meat industry than infectious disease:

- **Skeletal disorders (broilers & turkeys)**
- **Ascites (broilers & turkeys)**
- **Round heart & aortic rupture (turkeys)**
- ~~**Sudden death syndrome (broilers)**~~

Fast growth problems

But are skeletal problems painful?

Answer not immediately obvious.

Both turkeys and broilers with no obvious pain signs, sit about more than expected.

Lethargy? Laziness?

Fast growth problems

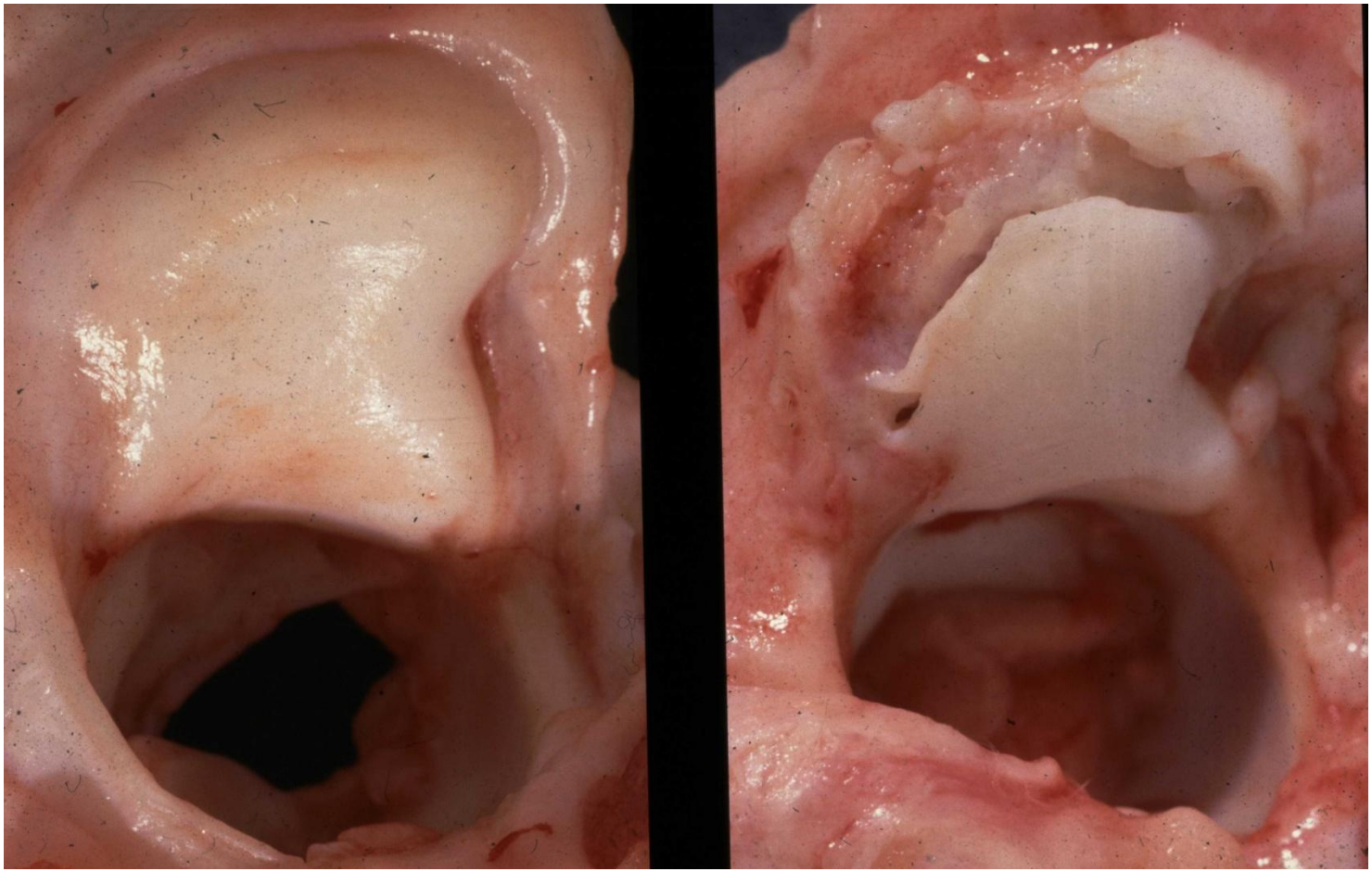
When male turkeys were given drug (betamethasone) that reduces pain and inflammation in arthritic joints :-

- **Showed more spontaneous activity**
- **Walked faster in sexual motivation test**

(Duncan *et al.*, 1991; Hocking *et al.*, 1999)

Fast growth problems

NORMAL AFFECTED



P.M. examination revealed that turkeys were suffering from degenerative hip disorders

Fast growth problems

Danbury *et al.*, 2000. Self-selection of the analgesic drug carprofen by lame broiler chickens. *Vet. Rec.* 146: 307-311.

This is very exciting research!

It has revealed that chickens can tell us what they feel about being in pain.

5. Feed restriction in broiler breeders

Broiler breeders have huge appetites

Feed restriction in broiler breeders

If allowed to feed to appetite, breeders become obese, 'unfit' and they suffer.

If feed-restricted, (to 35-40%) they function well, their nutritional needs are met, and they appear to be 'fitter'.

***But* their welfare is severely compromised by the feed restriction**

THEY FEEL HUNGRY ALL THE TIME!

Feed restriction in broiler breeders

We may have produced a monster, impossible to manage without compromising welfare.

Protect long-term welfare → **Bird suffers hunger**

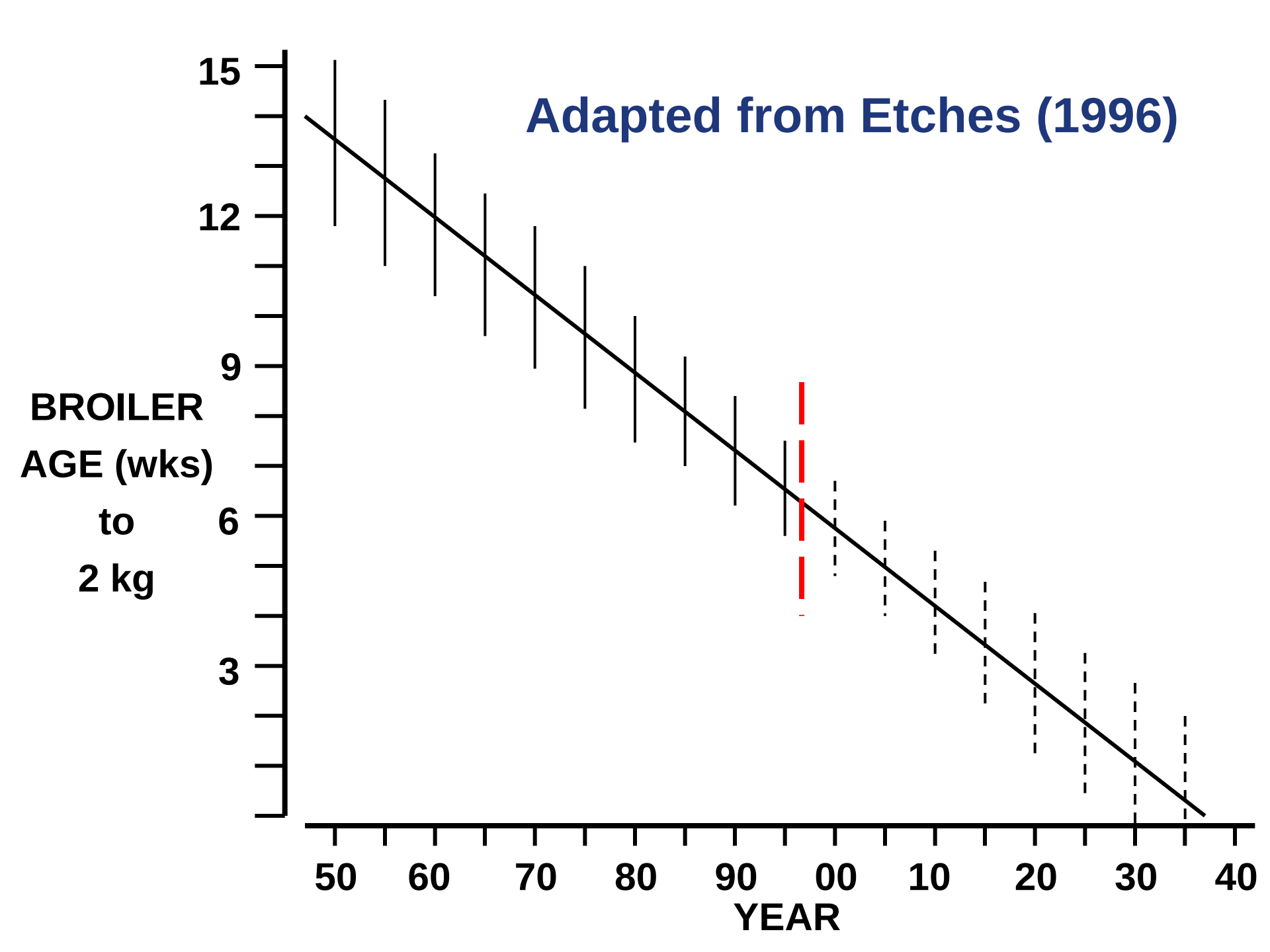
Satisfy short-term welfare → **Bird suffers from obesity**

Feed restriction in broiler breeders

Band-aid solutions (diet dilution) only work in the short-term.

The ultimate solution is for Primary Breeders to accept that we have reached the limits of growth.

Primary Breeders should be adding value to their product in some other way.


Adapted from Etches (1996)
BROILER AGE (wks) to 2 kg
15
12
9
6
3
50
60
70
80
90
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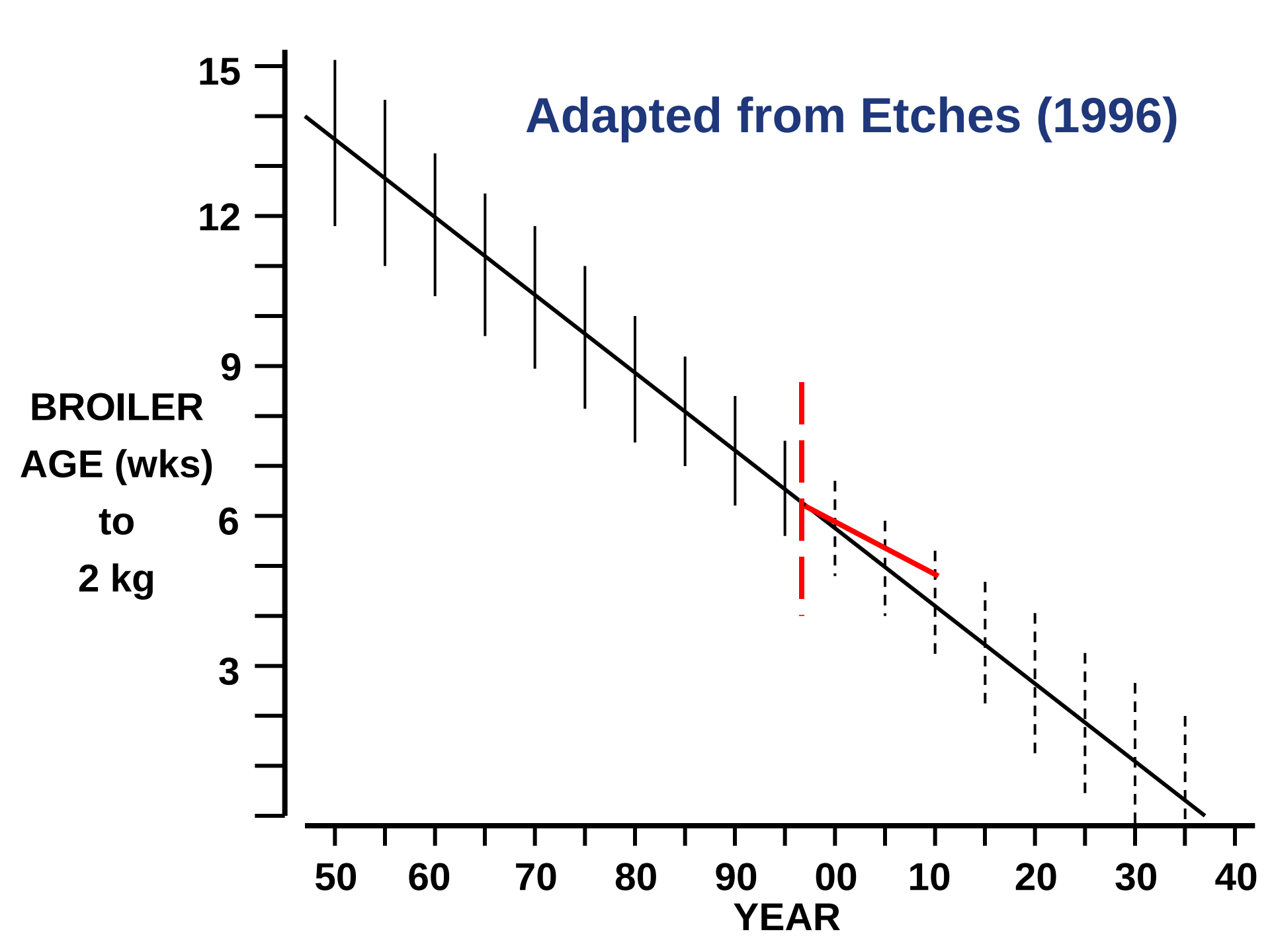
10
20
30
40
YEAR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YEAR

6. Hyper-aggressiveness in broiler breeders

Problem emerged in early 1990s.

Males of certain lines (now most lines) extremely aggressive towards females injuring and even killing them.

Fertility declines.

Hyper-aggressiveness in broiler breeders

Very unusual problem.

Males usually dominate females passively and seldom show overt aggression to them.

It is a welfare problem as well as a production problem because females are injured and suffer.

Hyper-aggressiveness in broiler breeders

- Not a general increase in aggression (fighting cocks treat hens very well).
- Not due to food restriction during rearing or adult phase.
- A male problem; females are normal.
- Males are (also) deficient in some aspects of courtship behaviour.

(Millman & Duncan, 2000; Millman *et al*., 2000)

Hyper-aggressiveness in broiler breeders

Might be connected with :-

- **Selection for breast meat (Cornish?)**
- **Mistaken selection for libido**

Still a belief in industry that infertility is due to decreased libido; in fact it is due to poor pelvic flexibility

(Duncan et al., 1990)

Hyper-aggressiveness in broiler breeders

- Band-aid solutions (increasing sex ratio) only help in the short-term
- Long-term solution will almost certainly be genetic
- Current use of the word “aggressive”
- Being vigorously sexy and being aggressive are very different

7. Transportation and slaughter

Transportation

Transportation vehicles not well designed

Winter mortalities are a problem
(Bruce Hunter survey)

Solution – better vehicle design and more attention to crate density

Transportation and slaughter

Slaughter

Water bath stunning not very efficient (too many variables).

Two emerging techniques that are promising:

(a) Controlled Atmosphere Stunning (CAS)

(b) Low Atmospheric Pressure Stunning (LAPS)

Transportation and slaughter

CAS (killing)

Goal is low oxygen levels

- **Argon good but expensive**
- **Latest is mixture of nitrogen and argon**
- **CO_2 is good if used in two phases (less intense tetany)**

Transportation and slaughter

LAPS (killing)

- Rate of pressure reduction extremely important (and secret!)
- Surprisingly, evidence suggests that it is completely humane (no “bends”)
- Completely safe for operators
- Completely safe for environment (no gases released)

Transportation and slaughter

Both CAS and LAPS:

- **Birds killed in transport crates**
- **Very humane death**
- **No risk of recovery**
- **Improved product (less bruising)**
- **Better conditions for shacklers**

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