# Antibiotic resistance, animal welfare and system sustainability

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## Sustainability

A key question about any production system is whether it is sustainable?

A system or procedure is sustainable if it is acceptable now and if its expected future effects are acceptable, in particular in relation to resource availability, consequences of functioning and morality of action.

An animal usage system might be unsustainable because it involves:

depletion of a resource,

or a product of the system accumulates and prevents functioning,

or the general public find the system unacceptable for any reason,

e.g.

- harms to the persons involved in production,
- harms to other people,
- harms to other animals in that their welfare is poor,
- harms to the environment .

What makes a food production system unsustainable?
Roughly in order of current consumer priorities:

**Adverse effects on human health**

**Poor welfare of animals**

**Unacceptable genetic modification**

**Harmful environmental effects**

**Inefficient usage of world food resources**

**Not "Fair trade" – producers in poor countries do not receive a fair reward**

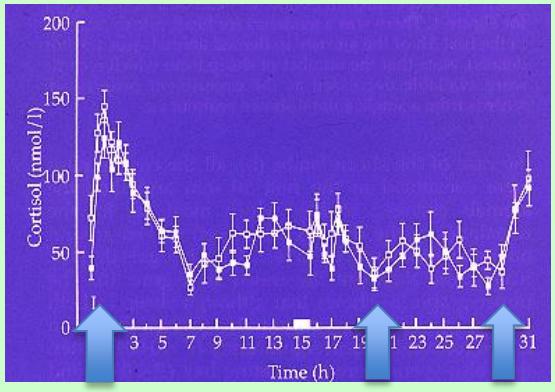
**Not preserving rural communities**

These factors, in addition to taste and price, also result in product quality being judged to be poor.

# Animal Welfare

The term welfare is used for all animals, including humans,
not for plants or inanimate objects.
The welfare of an individual is its state as regards its attempts to cope with its environment.

This includes both the extent of failure to cope and the ease or difficulty in coping.
Welfare varies over a range from very good to very poor.
We now have a wide range of measures of the needs and of the welfare of many animal species.




Loading Motorway Road with bends

Sheep welfare during transport.


Cambridge Grimace Scale for sheep EU AWIN project.

# Animal Welfare

Welfare refers to all coping mechanisms: physiological, behavioural, many feelings, responses to pathology.

Health is a key part of welfare.

Welfare is a characteristic of an individual animal.
Animal protection is something humans do.
Animal protection laws are limited to certain animals. Which are sentient?

Quality of life means welfare - so the same scientific measures can be used.

Carefully-controlled use of antibiotics and other pathogen-killing drugs reduces disease in affected individuals, improves health and hence improves welfare.

It can also reduce the number of affected individuals.

Effective antibiotic use improves animal welfare, just as it improves human welfare.

If the antibiotic or anthelmintic is not effective because of pathogen resistance, welfare is worse.

Antibiotics are used as growth promoters as well as for therapeutic and prophylactic use.

If this use increases the development of antibiotic resistance, it should not be permitted. Inefficient prophylactic and therapeutic use should also be reduced or prohibited.
When is use prophylactic and when growth promoting?

**Example 1.** Sheep with footrot, caused by *Diclobacter,* can be treated with a systemic antibiotic, e.g. tulathromycin.

Footrot cannot be safely controlled in other ways.

Dip the infected feet – does not prevent footrot and severe pain. Collect sheep to dip them - spreads disease.

What is the best balance?
Can the disease be eradicated from an area?
Can resistant strains of sheep be bred?

**Example 2.** Calf pneumonia. As human, viral? bacterial? Treat individual or group? Which bacteria? Use narrow spectrum antibiotic. Better colostrum provision.

**Example 3.** Treat dry cows against mastitis – once with ampicillin or cephalosporin protects 4-6 weeks.
Teat sealant may solve. Other mastitis – which bacteria?

**Example 4.** Routine surgery of cats and dogs, e.g. bitch spay.
Antibiotic use formerly standard, now much less i.e. single high dose instead of course of treatment, or not advised (guidelines British Veterinary Association).

Parallels with human surgery.

Housing and management conditions for animals that result in poor welfare suppress immune system function and result in increased disease.
Poultry and pig housing problems - high stocking density, needs not met.

Some of the increased disease in human slum dwellers has the same cause.

Diana et al (2016)- rear pigs, no antibiotics grow slower, welfare not worse.

High levels of antibiotic usage on farms has long been considered an indicator of poor management.

Antibiotics can be a prop for poor management of animal and human disease.

## Conclusions

There is increasing demand from consumers for sustainable systems - avoidance of adverse effects on human welfare, animal welfare and the environment.

Animal welfare science has developed rapidly.
Health is an important part of welfare.

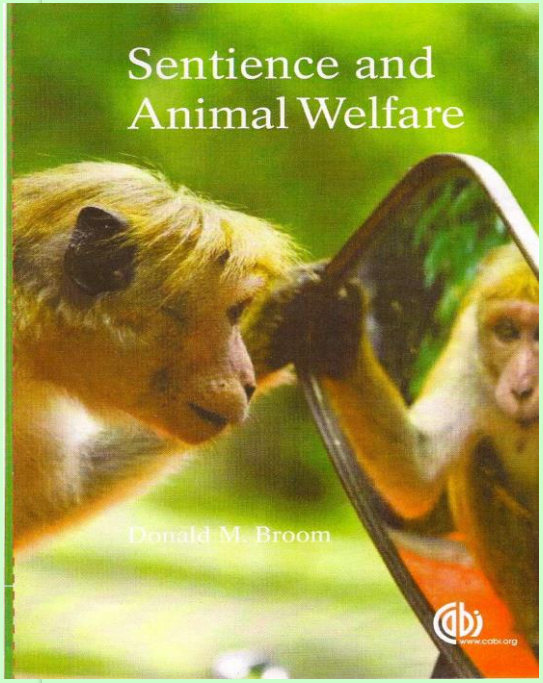
Treatment of disease with antibiotics improves welfare and cannot do so if the antibiotics do not work.

Arguments to continue to use antibiotics –
no alternative,
disease can be eradicated from area,
use is specific to pathogen so less broad spectrum use.

Poor systems of housing and management – more immunosuppression.

High antibiotic use is indicator of poor welfare and poor system.

Improve systems as well as efficiency of antibiotic use.

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