



動物

福利與現代獸醫發展 國際研討會

主講人：Donald M. Broom
劍橋大學，全球第一位動物福利科學教授



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位：社團法人台灣動物社會研
究會 ● 日期：2012年3月27～
28，為期2天。(上午8:30～下午
6:00) ● 地點：臺灣大學校總
區獸醫系三館B01會議廳(臺北
市羅斯福路四段一號)

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動物福利與現代獸醫發展」國際研討會

議 程

第一天：101/3/27 (二)

時間	主題	講座
8：30-9：00	報到	
9：00-9：30	致詞與大會報告	主辦單位 台大獸醫專業學院院長 周晉澄教授 台大生物資源暨農學院院長 徐源泰教授
9：30-11：00	The history of animal welfare concepts and animal welfare science. 動物福利概念與動物福利科學簡史	Professor Donald Broom.
11：00-12：30	The role of animal welfare science in sustainability and product quality. 動物福利科學在永續畜牧和動物產製品品質上所扮演的角色	Professor Donald Broom.
12：30-14：00	午膳	
14：00-14：30	上午的回顧 Q & A	主持人：台大獸醫專業學院院長周晉澄教授
14：30-16：00	Recent developments in animal welfare science. 動物福利科學的最新發展	Professor Donald Broom.
16：00-16：30	茶敘、休息時間	
16：30-17：00	Q & A 座談	主持人：台大獸醫專業學院院長周晉澄教授

第二天：101/3/28(三)

時間	主題	講座
8：30-9：00	報到	
9：00-10：00	Sentience, welfare and obligations to animals. 動物的知覺、福利，與人對動物的責任	Professor Donald Broom.
10：00-11：00	Welfare of wild animals in captivity 圈養野生動物的福利	Professor Donald Broom.
11：00-12：00	welfare in relation to farm operations (castrate etc.) 與畜牧作業有關的動物福利（例如「閹割」）	Professor Donald Broom.
12：00-13：00	午膳	
13：00-13：30	上午的回顧 Q & A	主持人：台大獸醫專業學院 葉力森教授
13：30-15：00	welfare during transport 運輸動物福利	Professor Donald Broom.
15：00-15：30	茶敘、休息時間	
15：30-17：00	cattle welfare 牛的動物福利 pig welfare 豬的動物福利 poultry welfare 雞的動物福利	Professor Donald Broom.
17：00-18：00	Q & A 座談	主持人：台大獸醫專業學院 葉力森教授

講師簡介



Donald M. Broom 教授

Donald M. Broom 自 1986 至 2009 年，擔任英國劍橋大學獸醫學院動物福利學教授。在發展動物福利科學的研究方法與觀念上，貢獻卓著。特別是豬、牛、家禽，同伴動物，以及圈養野生動物的飼養、管理和運輸有關的動物福利科學評估。近年來，研究領域著重於馴養動物的認知 (cognition in domestic animals)，動物倫理，以及人類社會的「動物態度」。

Donald M. Broom 自 1990 至 2009 年間擔任歐盟動物福利科學委員會(EUSCAW)的副主席及主席。至今仍為歐洲食品安全管理局(EFSA)動物健康與福利科學諮詢小組的成員。同時也是世界動物衛生組織(OIE)陸地運輸動物福利小組主席。發表超過 300 篇學術論文，曾應邀於 37 個國家發表演講，出版過 8 本專書，其中包括：《緊迫與動物福利》(Stress and Animal Welfare)，《馴養動物的行為與福利》(Domestic Animal Behaviour and Welfare)，以及《道德與宗教的演化》(The Evolution of Morality and Religion)。

**The history
of the concept of animal welfare,
of related concepts
and of animal welfare science**



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**動物福利觀念史，相關概念及
動物福利科學史**



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Animal welfare is a scientific concept.

What humans do about it is an ethical issue.

No application of the science can occur without understanding arguments about ethical positions.

I shall speak mainly about the science and shall separate it from the ethics.

Topics

1. Morality in relation to animal use.
2. History of the basis of the welfare concept.
3. Usable welfare concepts now and how they are inter-related.
4. Links to other moral issues that are not welfare but may be considered at the same time as welfare.
5. Future concerns.

動物福利是一種科學觀念

人類如何做則是倫理學的範疇

必須了解倫理學的爭議，才能知道如何應用科學

此演講的主題在科學，應與倫理學分開討論

講題

1. 使用動物的道德
2. 動物福利基礎觀念史
3. 當今有用的福利觀念以及彼此的關係
4. 其他非福利但與道德相關的議題，可能也必須當作福利問題來考量
5. 未來的關懷

Animals have always had welfare but what humans know of it has become modified over time, especially recently.

The human concepts of what are and are not **moral actions** have probably changed little over many millennia.

However, ideas about which individuals should be the subject of such actions have changed with :

- (i) **increasing knowledge** of the functioning of humans and other animals,
- (ii) **improved communication** in the world.

動物一直有福利，但人類對福利的認知與時俱進，尤其是最近。

人類對哪些行為符合倫理，哪些不符合的觀念在過去幾世紀卻很少改變。

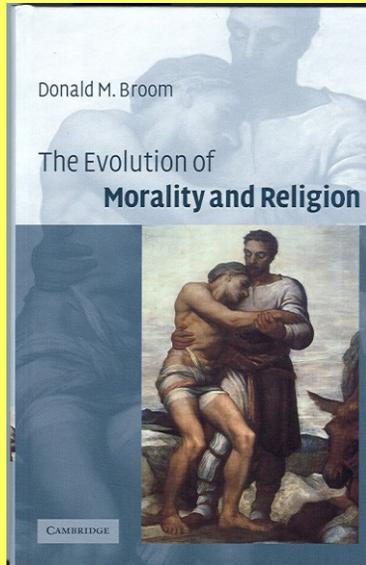
然而，對於哪些動物個體必須是道德行為的主體，則因為以下原因而改變：

- (i) 對人類與動物生理功能的**知識增加**
- (ii) 全球**互通的進步**

Background: morality has a biological basis.

1. Helping others and not harming others are effective strategies, especially for animals that live in long-lasting social groups.
2. Morality has evolved and religion is a structure for morality.
3. Attitudes to others have been much affected by the major improvements in communication.
4. Non-human animals are now generally included amongst the individuals about whom we should care.

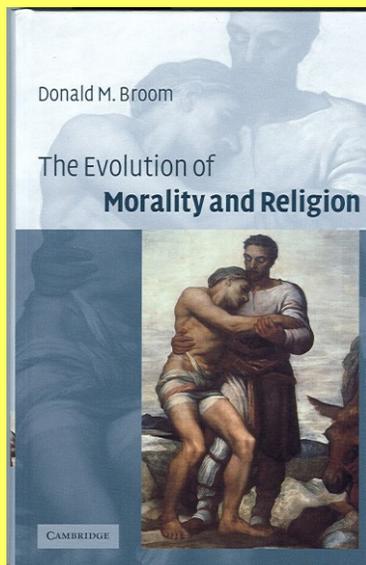
(Broom 2003).



背景：道德具有生物學基礎

1. 幫助且不傷害其他個體，是有效的策略，尤其是對生活在長期維繫社群中的動物。
2. 道德在演化，宗教則是一種道德框架。
3. 因溝通的大幅改善，影響我們對其他生命個體的態度。
4. 非人類動物個體已廣泛被納入為人類關懷的對象。

(Broom 2003)



In all human societies of which there are detailed records there are observations of animal functioning: behaviour, physiology, pathology.

Very many parallels with humans are apparent and are described.

Sumerians, Greeks, Mayans, Chinese, etc.

Ideas about non-human animals: various harms, body regulation, objectives and their realisation, emotional responses, abilities to control environment.

Bentham. Can they reason? Do they suffer?

Most people who have lived with or looked closely at animals assumed that they could do both to some extent.

As Duncan (2006) has said, **up to the 19th century**, the view was very widespread. It was based on science, that is on observation and deduction.)

The “**Descartes view**” was just used by those whom it suited.

所有人類社會對動物的詳細觀察與描述，都指出動物在功能、行為、生理、病理上，與人類近似。

蘇美爾人，希臘人，瑪雅人，中國人等

對非人類動物的想法：各種危害，調節身體，目標和實現，情緒反應，控制環境的能力。

邊沁：他們能思考嗎？他們會受苦嗎？

大多數與動物一起生活或近距離觀察動物的人，都認為他們具有一定程度的這兩種能力。

直到19世紀，此觀點被廣泛的接受，此觀點是依據科學、觀察與演繹 “**笛卡爾觀點**” 只適合那些一意孤行的人。

The 19th century and the 20th century up to 1970

Knowledge about biological functioning increased. Scientific disciplines such as ethology started to become accepted.

In 1964 **Ruth Harrison's** (UK) book “Animal Machines” was published.

In 1965 the U.K. Government set up the Brambell Committee. One of its members was **W. H. Thorpe**, an ethologist in Cambridge. He explained that animals have needs with a biological basis and that animals would have problems if there was frustration of natural behaviour. This view came to be written in the Brambell Report as the “five freedoms”

Bill Thorpe was my Ph.D. supervisor. He asked me in 1964 to comment on some material used by the Committee.

Professor Brambell's committee did not define welfare in their report.

At this time, the emphasis was on what people should do.

On animal protection (Tierschutz), not on animal welfare (Wohlergehen).

19世紀到20世紀1970年

有關生物功能的知識增加。科學領域，如動物行為學開始被接受。

1964年，英國**Ruth Harrison's**的著作“動物機器”出版。

英國政府在1965年成立的Brambell委員會。其成員之一，**W.H. Thorpe** 為劍橋大學行為學家，解釋說，動物有生物的基本需求，動物無法表現自然的行為，就會產生問題而且會感到沮喪，這些觀點被寫在Brambell報告，並發展成“五大自由”。

Bill Thorpe是我的Ph.D.指導教授，1964年他要求我針對委員會所使用的一些資料提供意見。

Brambell教授的委員會在報告中並未定義福利

在這期間，大家強調的是：針對保護動物，人類應該做甚麼？而不是動物福利。

In the 1970s and early 1980s.

The term animal welfare was used but not defined and not considered scientific by most scientists.

A development of major importance to animal welfare was research by ethologists and psychologists on **motivation systems**. The writings of Neal Miller (US) Robert Hinde (UK), David McFarland (UK) and others helped ethologists to understand control systems and how animals came to take decisions.

A review of my 1981 book “Biology of Behaviour” pointed out that the animals I described were presented as sophisticated decision-makers in what they did. This contrasted greatly with the, by then discredited, view of animals as automata driven by “instinct”.

Key research by Ian Duncan (UK) and David Wood-Gush (SA/UK) explained the motivation of animals whose **needs** were not met so the animals were frustrated. They, and Barry Hughes (UK) (see also Toates and Jensen 1991), explained the biological basis of needs.

1970年代到1980年代早期

動物福利這個名詞被使用但卻未被定義，大多數的科學家並不認為是科學。

動物行為學家和心理學家研究動物的**動機系統**，對動物福利的發展有重大貢獻。從Neal Miller (US) Robert Hinde (UK)，David McFarland (UK) 等行為學家的著作中，可以了解動物的控制系統以及動物如何作出決定。

我1981年的著作“行為生物學”，指出我所描述的動物是複雜的決策者，推翻既有觀點：認為動物只是單純被“本能”驅使的機器。

Ian Duncan (UK) 和 David Wood-Gush (SA/UK) 的關鍵性研究，解釋動物的動機。當動物的**需求**無法被滿足時會感到挫折。他們與Barry Hughes (UK) (還有 Toates and Jensen 1991) 闡述了生物的基本需求。

In the 1970s and early 1980s.

There was also much work on the evolution of behaviour, sociobiology. Many of those who worked on motivation changed to applied ethology studies, particularly to animal welfare, e.g. Broom (UK), M. Dawkins (UK), Duncan, D. Fraser (CA), Ladewig (DK), Matthews (NZ), Vestergaard (DK) Wiepkema (NL).

At the same time, the scientific use of the term **stress** was being questioned. Its use by Hans Selye (D?/US) was clearly ambiguous and, as J. Mason (US) pointed out, to some degree erroneous in that the HPA and SAM physiological mechanisms were presented as general to all situations.

Its meaning?

At one extreme, some restricted it to HPA axis activity.

At the other, some used it for any stimulation.

I suggested (1983) that it should be limited to adverse or potentially adverse effects with fitness reduction as the criterion. This view was supported by Dantzer (F), von Holst (D), Moberg (US), Mormède (F), Toates (UK) but ignored by medical and most physiological researchers.

1970年代到1980年代前期

這個時期也有許多關於行為演化，社會生物學的研究。許多曾從事動機研究的學者改為研究應用動物行為學，特別是動物福利，例如Broom (UK)，M. Dawkins (UK)，Duncan，D. Fraser (CA)，Ladewig (DK)，Matthews (NZ)，Vestergaard (DK)，Wiepkema (NL)。

這個時期，在科學上使用**緊迫**這個名詞會被質疑。如同J. Mason指出，Hans Selye使用的定義模糊不清，其中有某種程度的錯誤，HPA和SAM生理學作用機制在大多數的型況下都會出現。

如何解釋？

有人將他限制在HPA軸的活動，另一個極端則用在任何的刺激上。

我在1983年建議，應該限制在是否對健康造成不利，或具潛在不利的影響作為標準。此觀點獲得Dantzer (F)，von Holst (D)，Moberg (US)，Mormède(F)，Toates(UK)的支持，但醫學和大多數的生物學研究者都忽視它。

In the 1970s and early 1980s.

The idea that domestic animals were completely modified by man and therefore scarcely biological and not comparable with their wild equivalents was being challenged.

Glen McBride (AU) studied a population of feral chickens on an island off Australia.

David Wood-Gush studied another domestic fowl population and, later with Alex Stolba (CH), a group of sows kept in fields with trees.

Per Jensen (DK/SE), encouraged by Ingvar Ekesbo (SE), carried out a detailed study of modern domestic pigs in woodland conditions.

The conclusion from this work was that the behaviour of these farm animal breeds was scarcely distinguishable in many respects from that of their wild ancestors.

However, there were great differences in tolerance of humans and ability to breed in restricted, suboptimal situations.

1970年代到1980年代前期

「豢養動物完全由人類掌控，不具多少生物特性，也不能跟牠們的野生同類相比」，這種觀念開始被挑戰。

Glen McBride研究一群澳洲小島的野雞。

David Wood-Gush研究一群豢養的禽類，之後和Alex Stolba一起研究一群養在野外樹林的母豬。

Per Jensen在Ingvar Ekesbo的鼓勵下，從事將現代馴養豬隻養在樹林環境的精細研究。

此研究的結論是這些豬和他們的祖先在行為上並無明顯差異。

最大的差異在對人類的耐受度，以及在人為控制環境下的繁殖能力。

In the 1970s and early 1980s.

At this time, most of the animal welfare researchers were in zoology or animal production departments in universities and research institutes.

Many veterinarians were trying to cure or prevent animal disease for the benefit of the animals.

Veterinarians who contributed to more general aspects of animal welfare science included Andrew Fraser (UK/CA), Ingvar Ekesbo, Henrik Simonsen (DK), Robert Dantzer, Roger Ewbank (UK) and Barry Hughes.

Andrew was one of the founders of the Society for Veterinary Ethology (later the International Society for Applied Ethology), still the major scientific society for animal welfare science. He was also editor of the journal then called "Applied Animal Ethology" and now called "Applied Animal Behaviour Science".

Some of these used their clinical knowledge to ensure that the health of animals was properly considered in evaluation of welfare whilst others carried out experimental work.

1970年代到1980年代前期

這個時期動物福利的研究者，大多是大學或研究機構的動物學系或動物生產部門。

許多獸醫嘗試治療或預防動物疾病以嘉惠動物。

Andrew Fraser (UK/CA), Ingvar Ekesbo, Henrik Simonsen (DK), Robert Dantzer, Roger Ewbank (UK) and Barry Hughes, 這些獸醫師在動物福利科學上做出較大範疇的貢獻。

Andrew Fraser是獸醫動物行為學協會的發起人之一（之後改名為國際應用動物學協會），至今仍是動物福利科學的主要科學協會。他也是“應用動物行為學”期刊的編者，這個期刊後來改名為「應用動物行為科學」。

有些人應用他們的臨床知識，確保動物的健康是動物福利的必要評估項目，有些人則從事實驗工作。

Early 1980s

Much of the discussion about the use of animals centred on whether or not they should be killed.

Philosophers and the public were often concerned with the ethics of killing animals for human food, human clothing, scientific research or as unwanted pets.

The animal welfare issue is what happens before death, including how they are killed.



1980年代早期

關於使用動物的討論，都集中在是否應該殺這些動物。

哲學家和大眾通常關注在為人類的食物、衣服、科學實驗，以及不想要的寵物而屠宰動物的倫理。

動物福利問題發生在動物死亡前，包括如何屠宰。



Early 1980s: accepted by most biologists and veterinarians – animals and response systems are subject to challenges from their environment.

pathogens,

tissue damage,

attack or threat of attack by a conspecific or predator,

other social competition,

complexity of information processing in a situation where an individual receives excessive stimulation,

lack of key stimuli such as a teat for a young mammal or those associated with social contact for a social animal,

lack of overall stimulation.

In general, inability to control interactions with their environment.

大多數的生物學家和獸醫師接受：動物及反應系統容易遭受所處環境的挑戰

病原。

組織傷害。

被同種動物或掠食者攻擊或威脅。

其他社會競爭。

當個體受到過度刺激時，處理訊息的複雜度。

缺乏關鍵刺激，例如乳頭對哺乳類的幼獸、或群居動物的社會化接觸

缺乏總體的刺激。

整體而言，缺乏控制與環境互動的能力。

Effects on animal welfare which can be described include those of:

disease,
injury,
starvation,
beneficial stimulation,
social interactions – positive or negative,
other forms of success in actions,
housing conditions – positive or negative,
deliberate or accidental ill treatment,
human handling – positive or negative,
transport,
laboratory procedures,
various mutilations,
veterinary treatment – positive or negative,
genetic change by conventional or other breeding.



動物福利的影響因素包括：

疾病
受傷
飢餓
有益的刺激
社會互動—正面或負面
其他形式的成功行為
欄舍條件—正面或負面
蓄意或意外的虐待
人為處理—正面或負面
運輸
實驗程序
各種肢體傷殘
獸醫治療—正面或負面
現有品系或與他種品系育種的基因改變



Early 1980s.

Following these generally accepted views of the functioning of animals and also the writings of Lorca, Barry Hughes (1981) proposed that the term animal welfare meant that the animal was in harmony with nature, or with its environment.

This is a biologically relevant statement and a precursor of later views but it is not a usable definition.

Being in harmony is a single state so it does not allow scientific measurement.

However, the term welfare was being used more and more in science, in laws and in discussion about the effects of the treatment of laboratory, farm and companion animals.

There was a clear need for a scientific definition.

1980年代早期

依據這些普遍被適應的動物功能觀點，以及Lorca的著作，Barry Hughes在1981年提出所謂「動物福利就是動物與自然或所處環境的和諧」。

這是一種生物相關的聲明，是後續觀點的先驅，但並不是實用的定義。

和諧是一個單一的狀態，無法以科學測量。

然而，福利這個詞在科學、法律、以及在討論實驗室的處理、農場動物、同伴動物的因素時不斷的被提到。

科學上的定義非常需要。

In 1986 I presented this definition of welfare.

The **welfare** of an individual is its state as regards its attempts to cope with its environment.

In a series of papers (1988 -1991), I emphasised that:

Welfare will be poor if there is difficulty in coping or failure to cope.

One or more coping strategies may be used to attempt to cope with a particular challenge. Feelings, such as pain, fear, pleasure, may be part of a coping strategy.

The system may operate successfully so that coping is achieved or may be unsuccessful in that the individual is harmed.

Welfare can be measured scientifically and varies over a range from very good to very poor.

1986年我提出福利的定義

福利是一個「獨立個體試圖因應其環境的狀態」

在一系列的論文（1988-1991）中我強調：

如果因應困難或失敗，福利就會變差。

可能採用一個或多個因應策略，去因應一個特定的挑戰。感覺，例如疼痛、害怕、愉悅都可能是因應的策略。

系統可能成功的操作達成因應目的，但也可能失敗，個體就被傷害。

福利可以科學的方法測量，其變化可以從非常好到非常差。

In the early 1990s and later, this definition was referred to as a functional definition and was contrasted with the feelings -related definitions of Ian Duncan (see Broom 2008).

Duncan argued that welfare is wholly about feelings.

My papers referred to feelings but as a part of welfare.



Even in recent times, this myth has been perpetuated. For example, Dwyer and Lawrence (2008) argued that my definition is a functional one, rather than one that refers to suffering and other feelings.

This was never the case and it is clearly explained by Broom (1991) that when welfare is defined in this way, feelings are included.

The arguments for the evolution of feelings as part of animal functioning are explained by Broom (1993 and especially 1998 and also Broom and Fraser 2007).

在1990年代初期之後，這個定義被歸類為功能性定義，與Ian Duncan的感覺性定義相對應。（see Broom 2008）

Doncan主張福利完全是感覺。

我的論文也提到感覺。但認為那只是福利的一部分。



即使到最近，相同的迷思仍然持續，例如Dwyer和Lawrence（2008）主張我的定義是功能性的，忽略了受苦和其他的感覺。

其實不然，在我1991年的論文裡提到，當福利以此定義，感覺也包括在內。

我在1993、1998以及2007和Fraser已解釋如何主張感覺的演化是動物功能的一部分。（1993 and especially 1998 and also Broom and Fraser 2007).

When coping is successful and problems are absent or minor, welfare is good.

Good welfare is generally associated with feelings of pleasure or contentment.

Like bad feelings, such as pain or fear, good feelings are a biological mechanism which has evolved.

I have always tried to be precise about definitions of terms so (Broom 1998):

A **feeling** is a brain construct, involving at least perceptual awareness, which is associated with a life regulating system, is recognisable by the individual when it recurs and may change behaviour or act as a reinforcer in learning.

Suffering occurs when one or more negative feelings continue for more than a few seconds.

當因應成功，問題就會消失或變小，福利就變好。

良好的福利，與快樂或滿足的感覺相關。

就像壞的感覺，例如疼痛或害怕，好的感覺是生物機制的演化。

我一直自我要求定義必須精確，**感覺**是一種腦部建構（brain construct），至少包含了認知性的察覺（perceptual awareness），與生活調節系統相關，當事件重現時個體可以識別，並改變行為或因學習的強化而行動。

痛苦發生在一個或多個負面感覺持續超過數秒時。

There are problems with a definition of welfare that only refers to feelings.

Feelings are just one part of an animal's repertoire of coping mechanisms.

Although the brain condition which results in a feeling may have first arisen accidentally, most feelings now occurring are a result of natural selection and are adaptive.

Marian Dawkins argues that feelings and health are key aspects of welfare.

□ Although feelings are an important part of welfare, welfare involves more than feelings, for example:

an individual with a broken leg but asleep,

an addict who has just taken heroin,

an individual greatly affected by disease but unaware of it,

an injured individual whose pain system does not function.

如果只以感覺定義福利，會產生一些問題。

感覺是動物因應機制的一部分。

雖然感覺所導致的腦部狀況可能是偶發的，但是大多數感覺的出現是自然選擇的結果，且具適應性（adaptive）。

主張感覺和健康是福利的重點

雖然感覺是福利的重要部分，福利不只是感覺，還包括：

個體的腿斷了但可以安然入眠，

癮君子剛剛服用了海洛因，

個體患了嚴重疾病但並不知道，

個體受傷，但其痛覺系統無功能。

In the 1980s and early 1990s.

In contrast with the very few veterinarians who were involved in animal welfare research, most veterinarians were not very sympathetic to animal welfare as a scientific discipline that should be taught to veterinary students and be promoted by those in practice.

Many veterinarians thought: that only they knew about animal welfare, that almost all of welfare was treatment of or prevention of disease, and that animal behaviour was of minor importance to their work.

These views had close parallels with the medical profession in which those who studied behavioural or mental problems were thought of as peripheral to the major tasks of human medicine.

Vets, medics and scientists were unwilling to refer to animal feelings.

Research biologists in universities seldom thought of the study of animal welfare as a science. They often viewed it as an impediment to research.

It is still the case that no animal welfare scientists are regarded as major figures in science.

1980年代到1990年代早期

對比於極少數參與動物福利研究的獸醫，大多數獸醫並不完全認同動物福利，應教導獸醫系學生在執業中推廣動物福利。

許多獸醫認為：動物福利主要在疾病的治療與預防，而動物行為對獸醫的工作並不重要。

這個觀點和醫生認為，研究行為或心理問題是非主流的人類醫學，不謀而合。

獸醫、醫師和科學家都不願意提到動物的感覺。

大學裡的生物學家很少想到動物福利是科學研究，通常他們認為是研究的障礙。

至今，還沒有動物福利科學家，被認為是科學界的重要人士。

We need to relate the welfare terminology to the concept of adaptation.

How well can our domestic animals adapt to the conditions that we impose upon them?

Can wild animals adapt to our impact on them?

At the individual level, **adaptation** is the use of regulatory systems, with their behavioural and physiological components, to help an individual to cope with its environmental conditions.

Animals can adapt better if their needs are met.

我們必需將福利的術語，和適應的觀念相接和。

我們的家畜禽可以適應我們給他們的條件嗎？

野生動物可以適應我們帶給他們的衝擊嗎？

在個體的層級，**適應**是利用監管系統的行為和生理機能，協助其因應環境的狀況。

如果動物的需求可以滿足，會比較容易適應。

What are the limits to adaptation?

Where **coping** means having control of mental and bodily stability, an individual attempting to cope may fail to do so.

For example, it may be difficult or impossible to cope with:
extreme external temperature,
pathogen multiplication,
high predation risk or difficult social conditions.

Body state may be displaced to outside the tolerable range and death may follow.

適應的限制？

因應是指精神上或身體上的穩定控制，個體因應的企圖可能會失敗

下列情況可能很難因應：

極端的外部溫度，

病原複製，

高度被掠食的風險或「難搞的社會處遇」
(difficult social conditions)。

生體狀況可能超出可忍受的範圍，接著可能會死亡。

For most people, stress implies the effects of a challenge to the individual that disrupts homeostasis resulting in adverse effects.

Not just a stimulus which activates energy releasing control mechanisms.

Stimuli whose effects are beneficial would not be called stressors by most people.

Situations which activate the hypothalamic - pituitary - adrenal cortical axis, but whose effects are useful to the individual, would not be called stressors by most people.

Stress is an environmental effect on an individual which overtaxes control systems and results in adverse consequences, eventually reduced fitness.

There is no good stress. Taxing stimuli can be good experience.

對大多數人來說，緊迫意味著挑戰對個體的影響，破壞動態平衡造成不良效應。

不只是一種刺激，更是激發能量釋出的控制機制

如果某種刺激是有益的，大多數人不會稱之為緊迫源（stressors）

如果狀況可以激活下丘腦－垂體－腎上腺皮質軸，通常對個體是有用的。

對多數人而言，不能稱之為緊迫

緊迫是環境對個體的影響超過可控制的範圍，而產生的負面效應，最後破壞了健康

沒有好的「緊迫」這回事。課稅這檔事，就是一個很好的經驗。

An individual may adapt to an environmental situation with difficulty, in which case the welfare is poor. For example, if an individual is adapting, or has adapted, but is in pain or depressed.

Coping usually means that all mental and bodily systems have functioned so that the environmental impact is nullified.

Hence “to cope” is more than “to adapt”.

Adaptation does not necessarily mean good welfare.

Similarly, efficient production does not necessarily mean good welfare.

個體因應環境可能遭受困難，此時福利就受到負面影響，比如因應過程中感覺疼痛或沮喪

因應通常代表整體心理和身體系統功能都在運作，所以環境的刺激才能降低。

因此“因應”的意義大於“適應（to adapt）”。

適應並不一定等同於福利。

同樣的，生產效益也不等同於好的福利。

Motivational systems have evolved.
They enable individuals to ascribe priorities to certain actions,
as well as to determine the timing of actions. This facilitates adaptation.

A **need** is a requirement, which is part of the basic biology of an animal,
to obtain a particular resource or respond to a particular
environmental or bodily stimulus.

The need itself is in the brain.

It allows effective functioning of the animal.

It may be fulfilled by physiology or behaviour but the need is not
physiological or behavioural.

動機系統已經演化，並賦予個體某些行動的優先次序，
確定行動的時機，這有助於適應。

需求就是需要，是動物生物基礎的一部份，為獲得特定
資源，或對特定環境或生體刺激有所反應，

需求存在於大腦中。

使動物功能有效率。

需求可能被生理或行為滿足，但需求本身並不是生理或
行為。

Needs for resources, such as food, water or heat.

Needs to carry out actions whose function is to attain an objective.

For example:

a pig rooting in soil or manipulating material such as straw or twigs,



a hen dust-bathing to keep feathers in good condition,

a hen or a sow building a nest when about to give birth or lay an egg.

資源需求：例如食物、水、熱

行動需求：其功能為取得某種物件

例如：豬的拱土或玩弄各種墊料



蛋雞洗砂浴以保持羽毛良好

蛋雞或母豬即將生蛋或產褥時會想築巢

The idea of providing for “the five freedoms”, first suggested by W.H.Thorpe in the Brambell Report in 1965, is now replaced by the more scientific concept of needs.

The list of freedoms just provides a general guideline for non-specialists.

Animals have many needs and these have been investigated for many species. This is the starting point for reviews of the welfare of a species. A list of needs has been the starting point for Council of Europe recommendations and E.U. scientific reports on animal welfare for over 20 years.

The freedoms are not precise enough to be used as a basis for welfare assessment. This is now an out-dated approach that should not be used if scientific evidence about needs is available.

1965年由W. H. Thorpe 在布蘭貝爾報告所提的「五大自由」這個概念，現已經被比較科學化的「需求」所取代。

五大自由所列，僅係適用於非專業人士的一般概念。

動物有許多需求，許多物種的需求已被研究。這也是評估物種動物福利的起始點。列舉需求，成為歐盟議會議案，和歐盟科學報告的篇首要旨，已有20年歷史。

「自由」這個概念，要作為評估動物福利的基礎，不夠精準。如果已經有關於「需求」的科學證據存在，就應該別再使用這個過時的字眼。

How should we describe what should or should not be done to other individuals?

We should describe the obligations of the actor rather than the rights of the subject.

We all have obligations not to harm others.

If we keep or otherwise interact with animals we then have obligations in relation to their welfare.

Assertions of rights and freedoms cause problems.

我們應該如何描述對於其他個體什麼該做？什麼不該做？

我應該探討行動者的義務，甚於行動對象的權利。

我們都有不傷害動物的義務。

如果我們飼養，或與動物接觸，則我們有事關牠們福利的義務。

堅持使用「權利」或「自由」這個字，反而帶來麻煩。

Where does naturalness fit with the concept of welfare?

Fraser (1999) pointed out that when members of the public talk about animal welfare, their ideas include the functioning of the animals, the feelings of the animals and the naturalness of the environment.

Fraser did not say that these aspects contribute to a definition or concept of welfare. He did not advocate that naturalness be part of welfare assessment.

The feelings fit comfortably into my definition of welfare as they are an important component of coping mechanisms.

Naturalness is not at all part of the definition of welfare.

The state of an individual trying to cope with its environment will depend upon its biological functioning. Natural conditions have affected the needs of the animal and the evolution of coping mechanisms in the species.

The environment provided should fulfil the needs of the animal but does not have to be the same as the environment in the wild.

自然與動物福利概念

Fraser (1999) 指出，當公眾談到動物福利，他們的觀念涉及動物的功能，動物的感覺，和環境的自然狀態。

Fraser 並沒有說這些概念適合定義，或等於動物福利概念。

「感覺」跟我對動物福利的定義很契合，因為它們是因應機制的重要成分。

「自然」則完全不屬於福利定義。

個體生命依據其生物功能，以嘗試因應環境。天然環境影響動物的需求，以及物種因應機制的演化。

環境應足以滿足動物的需求，但不必然要與野外的環境一模一樣。

OIE said the following about animal welfare:

“Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment.”

This is essentially my definition but with other, somewhat confusing words added.

The first sentence is not good English. Also, it is not correct. ‘How an animal is coping’ means ‘by what method?’ Welfare is more than this.

The term ‘innate behaviour’ is not accurate as innate means unaffected by environmental factors, hence no behaviour is innate.

世界動物衛生組織（OIE）關於動物福利的說法：

“動物福利係指動物對其生活環境的因應狀態如何。如有科學證據顯示動物健康、舒適、營養充分、安全、能夠展現本質行為，且沒有因疼痛、恐懼、壓力而感到不愉悅，其動物福利就是良好。好的動物福利，要求疾病的預防與獸醫的照顧，適當的庇護、管理、營養、人道驅趕，人道屠宰和宰殺。動物福利指的是動物的狀態，動物所受的對待，是以其他名詞來表示，例如：動物照護，動物管理，人道對待等。”

這段話的基礎是我的定義，但卻加上屬於其他人，且會造成困擾的用詞遣字。

第一句話的英文表達不夠好也不正確。

動物如何「因應」，意味用「什麼方法」嗎？動物福利遠不僅於此。

「本質」(innate)行為，不夠精確，意味不會受到環境因素的影響，這麼一來，沒有什麼行為可以稱之為「本質行為」。

In recent years, public pressure in relation to codes of practice, laws and the enforcement of laws have increased in all countries concerning:

human health,

animal welfare,

impact on the environment.

In Europe, one of the big pressures for laws etc. in these areas has been the view that it is uncivilised to allow people to become sick, animals to be treated badly or the environment to be damaged.

近年來，所有關切下列事務的國家，都面臨公眾壓力要求訂立法律、標準，以及執法：

人類健康，

動物福利，

環境影響。

在歐洲，要求立法的壓力，來自於這樣的觀點：讓人民生病、動物被不當對待，以及環境被破壞是一種「不文明」。

Which animals should be protected and to what degree should they be protected?

For most people, animals with awareness are thought more worthy of protection.

The term welfare, although not applicable to inanimate objects or plants, is relevant to all animals because they have a nervous system, not just to sentient animals.

哪些動物要被保護，保護到什麼程度？

對多數人而言，具有覺知能力的動物值得保護。

就福利這個詞而言，雖然不適用於非生物，或是植物，但卻適用所有動物，因為牠們具有神經系統，而非僅適用於具有「情識」的動物（sentient animals）。

Health refers to what is happening in body systems, including those in the brain, which combat pathogens, tissue damage or physiological disorder. **Health** is the state of an individual as regards its attempts to cope with pathology.

With disease challenge, as well as with other challenges, difficult or inadequate adaptation results in poor welfare.

Health is an important part of welfare.



e.g. osteoarthritis in cats and dogs

e.g. sole ulcer in cows



健康是指生體系統發生了什麼，包括那些在腦部發生的現象，用以對抗病原，組織損傷，或生理功能失序。健康是個體企圖因應病原的狀態。

無論是疾病或其他挑戰，適應困難或不足，都會導致福利不良。

健康是福利的重要成分



犬貓之關節炎

乳牛足底潰爛



Areas of confusion in how some people use the term welfare
(although not amongst welfare scientists).

1. Protection
2. Death Euthanasia means that an animal is killed for its own benefit.
3. Naturalness
4. Dignity
5. Integrity of an animal

除動物福利科學家外，許多人談論福利會有混淆的地方

1. 保護
2. 死亡 安樂死則是指因動物本身的利益而殺死動物。
3. 自然
4. 尊嚴
5. 動物整體性

Areas of discussion amongst animal welfare scientists.

For some, all coping systems should be considered when assessing welfare.
For others, only those involving feelings should be considered.

□ For some of those discussing welfare, all health is part of welfare.
For others, health issues are separate.

Most of the latter are animal disease specialists.

動物福利科學家之間議論的範疇。

有些人認為所有因應的系統都應納入考量，其他人則認為只要考慮感覺就好。

有些人認為所有的健康問題都是福利的一部份，其他人則認為應該分開來看。

後者多數都是動物疾病的專家。

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The role of animal welfare science in sustainability and product quality



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動物福利科學在永續性和產品 品質上所扮演的角色



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Sustainability One moral question is about sustainability of systems.

A question about any production system is whether or not it is sustainable?

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

An animal usage system might be unsustainable because it involves so much depletion of resource that this resource will become unavailable to the system.

Or it could be because a product of the system accumulates to a degree which prevents the functioning of the system.

However, the first effect which makes a system unsustainable is one which the general public find unacceptable for any reason.

永續性 一個關於維持系統永續的道德問題。

一個存在於任何生產系統上的問題，就是它是否能繼續維持？

如果一個系統或程序不論在現在或未來都是可被接受的，就可以繼續維持，特別是關於資源可用性，運作的後果和行為道德觀。

一種動物使用系統涉及許多資源的消耗，則資源的匱乏，就會讓系統無法維持永續性。

或者可能因系統的產量累積到某種程度，而阻礙了系統的運作功能。

然而，無論任何理由只要社會大眾發現沒有辦法接受，這個系統就會受到影響而無法維持永續性。

Which consequences of acts or system functioning could be unacceptable immediately or later?

Harms to the persons involved in production, e.g. injury or other poor welfare.

Harms to other people, for example loss of a resource or poor welfare.

Harms to other animals in that their welfare is poor.

Harms to the environment of people or other animals and plants.

哪一個行為或系統運作的後果，是現在或將來會無法被接受的呢？

涉及對生產過程相關人員的危害，如受傷或其他不好的福利。

使其他人受到危害，如資源損失或福利不佳。

對動物造成傷害導致福利不佳。

對人居住的環境或其他動植物造成危害。

Who are the people or animals for whom some degree of poor welfare may make a manufacturing or animal production system unsustainable?

Because of increased efficiency of communication, the answer is that adverse effects on any people or animals in the world can have this effect:

- people poisoned by insecticide in China,
- pollution of a river by manure in Thailand,
- people catching Creutzfeldt Jacob disease from food, initially in U.K.,
- sheep on New Zealand or Australian ferry dying on the way to Saudi Arabia,
- chickens with avian influenza killed by inhumane methods in Indonesia,
- cattle in a slaughterhouse in the U.S.A. handled and killed inhumanely.

All can be headline news in world newspapers.

是哪些人或動物受到某些程度不好的福利，會使製造業或畜牧業系統無法永續？

因為溝通效率的提升，答案是任何受到不好影響的人或動物都有這個作用：

- 在中國，人們因噴灑的殺蟲劑而中毒。
- 在泰國，河川被糞肥污染。
- 最初在英國，人們因食物感染庫賈氏病。
- 從澳洲或紐西蘭載運至沙烏地阿拉伯的羊死在渡輪上。
- 在印尼，得禽流感的雞用不人道方式宰殺。
- 在美國，屠宰場的牛用不人道方式處理與宰殺。

以上都會成為全球報紙上的頭條新聞。

Public pressure

What are the consequences of media reports which the public find unacceptable?

Consumers may refuse to buy products from the company or country where the harm has occurred.

Examples of events which led to consumers refusing to buy animal and other products include:

- tuna sales drop sharply because dolphins are caught in tuna nets,
- all New Zealand product sales drop because of sheep dying in large numbers during transport,
- all French products avoided when calves were kept in small crates,
- sales of individual companies drop.



輿論壓力

什麼樣的媒體報導結果是民眾無法接受的？

消費者會因為來自一家公司或一個國家的產品，在生產過程有危害產生而拒絕購買。

導致消費者拒絕購買動物及其他產品的案例有：

- 因為在網具裡發現海豚受困而使得鮪魚銷售大量減少。
- 由於載送過程中有大量羊隻死亡而使得所有紐西蘭製品銷售銳減。
- 因小牛住在極小的條板箱裡造成大眾避免購買法國製品。
- 這些動物食品公司的銷售都降低。



Consumers drive legislation and retail company codes.

At present in Europe and other parts of the world, supermarket companies and restaurant chain companies are being forced by their customers to act in a moral way in relation to: human health,
animal welfare and
environmental impact of animal and plant
production methods.

Farmers throughout the world who wish to sell to these companies are having to comply with their production standards.

For example, pig producers in Brazil have to comply with the standards of Tesco and egg producers in Thailand have to comply with the standards of MacDonald's.

Example of the power of consumers.

July 2010 – following consumer pressure, Coles supermarket in Australia adopts policy that no pig meat will be bought if the sows were in stalls.

November 2010 – Australian pig producers agree to phase out stalls in 7 years.

Similar public pressure: New Zealand Government bans sow stalls Dec 2010.

消費者驅使相關立法和廠商訂立規範

現在，在歐洲和世界其他國家，超級市場與連鎖餐飲業被消費者驅使在許多方面必須符合道德規範，包括：人類健康、動物福利、動植物產品生產方式對於環境的影響。

世界各地想要賣產品到這些公司的農民，必須符合其產品標準。

如巴西的豬農要遵守TESCO的食品規範，而泰國的蛋農要遵守麥當勞的食品標準。

來自消費者的力量：

2010年7月，澳洲COLES超市順從民眾輿論壓力，採納一項政策，他們不賣來自還在使用母豬夾欄牧場的豬肉。

2010年11月，澳洲的豬肉業者同意在7年內分階段廢除母豬夾欄。

類似的輿論壓力，2010年12月紐西蘭政府禁止母豬夾欄。

QUALITY OF FOOD PRODUCTS

The concept of quality of goods that people buy has been changing.

Quality includes:

1. immediately observable aspects
2. consequences of consumption
3. ethics of the production method.

1. In the past, food products were mainly chosen because of price and taste.
2. If they cause people to become sick, the quality is considered poor.
For some people, if they make you fat, the quality is considered poor.
For others, if they have added nutrients, the quality is considered to be better.
3. Other factors considered by purchasers include:
the welfare of the animals used in production,
any impact on the environment, including conservation of wildlife,
ensuring a fair payment for producers, especially in poor countries,
the preservation of rural communities so that all do not go to towns.

食品品質

民眾對於食物品質標準的觀念一直在變。

品質標準包括：

1. 外觀立即可見
2. 食用後果
3. 食品製造過程的倫理性

1. 在過去，食品選擇主要著重在價格與味道。
2. 如果食品會讓民眾吃了生病，代表品質不好。
對某些人來說，吃了會變胖的食品，也代表品質不好。
對其他人來說，如果有外加營養成分的食品品質相對較好。
3. 其他購買者會考量的因素：
食品生產過程中的動物福利，
環境衝擊，包括野生動物保育，
確保生產者有公平交易，特別在貧窮國家，
維護農村社區而不是所有人都往城鎮發展。

QUALITY OF FOOD PRODUCTS

In order to take account of the ethics of the production method, products must be traceable.

Traceability

If foods can be traced, it is less likely that toxins, other poor quality materials or pathogens will be in them.

If animals can be traced, the sources of animal disease outbreaks are more likely to be found and places where injuries, or other causes of poor welfare occurred are more likely to be found.

Legislation ensuring traceability is important.

食品品質

為了生產方式的道德考量，食品必須提供可追溯的來源資訊。

可追溯性

如果食物可追溯來源，本身通常比較不會有毒素，黑心物質，或病原體的問題。

如果動物食品可以追溯來源，在傳染性動物疾病爆發時，來源追蹤會比較容易；同樣地，造成動物損傷或福利不佳的地區也會容易被發現。

確保可追溯性的立法具有重要性。

FOOD SAFETY

The public demands that food be safe, i.e. without damaging levels of toxins or pathogens, and that food quality, in the wide sense, should be good.

In order to achieve this, in the European Union the European Food Safety Authority (EFSA) has been set up. There are equivalents in other countries.

A major part of the work of the scientists who sit on the Panels and Working Groups is risk assessment.

The Member States of E.U. have extensive checking schemes for animals before and after slaughter as well as other food products.

食品安全

民眾會要求食品的安全性，例如：在廣義的食物品質上，不含超過標準的毒素或致病菌，應該算是具有良好品質。

為了達到此目的，歐盟設立歐洲食品安全管理局。其他國家也有成立相同的組織。

工作小組中的科學家最主要的工作是評估風險。

在動物屠宰和其他食品製作過程前後，歐盟國家的成員有詳盡的檢查計畫。

Scientific evidence is now playing a major part when new legislation or standards concerning animal production are proposed.

E.U.laws. Public demand leads to a scientific committee being asked to write a report. This is used by other organisations as well.

The scientific committees have become separated from the Commission staff.

E.U. Scientific Veterinary Committee, Animal Welfare Section (1990-1997)

E.U. Scientific Committee on Animal Health and Animal Welfare (1997-2003)

European Food Safety Authority Scientific Panel on Animal Health and Welfare (2003-present)

當有關動物產品製程的新草案或標準程序被提出時，科學證據將扮演重要的角色。

歐盟法令：民眾的要求促成科學委員會必須提出研究報告。這也被其他組織所援用。

許多科學委員會已從委員會分支成立：

歐盟獸醫科學委員會，動物福利組（1990-1997年）

歐盟動物健康和動物福利科學委員會（1997-2003年）

歐洲食品安全管理局動物健康與福利科學小組（2003年至今）

Reports of EFSA Scientific Panel AHAW:

GENERAL WELFARE

Welfare of non-human primates
 Hens
 Transport 1, 2, microclimate
 Pigs – castration
 Slaughter
 Pigs – space, flooring
 Rabbits
 Laboratory animals: 1. invertebrates,
 2. foetal, 3. breeding, 4. killing.
 Calves
 Imported captive birds: welfare and
 Pig welfare (series of reports)
 Killing and skinning of seals
 Welfare of farmed fish
 Humane killing of farmed fish
 Welfare of dairy cattle.

DISEASE

Brucellosis in sheep and goats
 Oral vaccination against rabies
 Diagnostics: FMD, CSF, AI
 CSF in wild boar
Mycobacterium avium paratuberculosis
 Rift valley fever
 Avian influenza
 Porcine resp repro syndrome
 Migratory birds and AI
 Rabies vaccination, testing needs
 Epizootic haemorrhagic disease
 Oyster herpes virus disease
 Q fever
 Ticks: Crimean-Congo haemorrhagic
 fever/African swine fever.

EFSA科學小組的研究報告：

一般福利

非人類靈長動物福利
 蛋雞
 運輸1, 2, 氣候
 豬 – 閹割
 屠宰場
 豬 – 空間, 地板
 兔子
 實驗動物: 1. 無脊椎動物 2. 胚胎 3. 繁殖 4. 宰殺
 小牛
 進口籠鳥: 福利與疾病的引進
 豬的福利 (系列報告)
 海豹獵殺與剥皮
 養殖魚類福利
 養殖魚類的人道宰殺
 乳牛福利

疾病

綿羊和山羊的布魯氏桿菌病
 口服狂犬病疫苗
 診斷: 口蹄疫, 腦脊液, 禽流感
 CSF, 野豬
 鳥分枝桿菌
 地谷熱
 禽流感
 候鳥與禽流感
 狂犬病疫苗, 測試需求
 流行性出血性疾病
 牡蠣胞疹病毒
 Q熱
 克里米亞 – 剛果出血
 發燒/非洲豬瘟

Risk assessment has been widely used in food toxicology and in relation to epidemiology of disease.

Recently, in EFSA we have applied the methodology to animal welfare issues.

The risk is that of poor welfare.

Our EFSA reports in recent years have included risk analyses.

However, it soon became apparent that in welfare and disease matters, we had to consider benefits as well as risk.

The benefit is good welfare. Improved management and consequent environment can mean better immune system function so benefits to health.

Hence our current reports have risk/benefit assessments. For details see EFSA reports and papers by Broom and Gavinelli in:

F.J.M. Smulders and B. Algers (eds) 2009. *Welfare of Production Animals: Assessment and Management of Risks*. Wageningen: Wageningen Academic Publishers.

風險評估已被廣泛用於食品毒理學和有關疾病流行病學研究。

最近，我們已向歐洲食品安全管理局申請動物福利議題的方法論。

所謂風險就是不好的福利。

近年來我們EFSA的報告有包含風險分析。

然而，在福利與疾病問題事件中，顯然我們要同時考慮到利益與風險。

好處是會有良好的福利，管理系統的改善和隨之影響的環境，代表更好的免疫系統對人體健康更有益處。

因此我們目前的報告都會有風險與效益評估。詳細內容可以看由 BROOM AND GAVINELLI 寫的 EFSA 報告及文件：

F.J.M. Smulders and B. Algers (eds) 2009. *Welfare of Production Animals: Assessment and Management of Risks*. Wageningen: Wageningen Academic Publishers.

What makes a production system unsustainable and results in product quality being judged as poor?

(Roughly in order of consumer priorities – I think that this order will change!)

Adverse effects on human health

Poor welfare of animals

Unacceptable genetic modification

Harmful environmental effects

Usage of world food resources

Not “Fair trade” – producers in poor countries do not receive a fair reward

Not preserving rural communities

怎樣會使一個生產系統無法維持，而使得產品品質被列為劣質？

（大致照消費者的優先次序來排列，但我覺得這順序會隨時變動）

對人體健康有不利影響

動物福利差

無法接受的基因改造

對環境造成損害

世界糧食資源的使用情況

沒有公平交易 – 在貧窮國家的生產者沒有獲得相等的報酬

無法保存僅存的農村社區

Some important factors for sustainability

1. Usage of world resources

What can be done to exploit existing resources better using animal production?

1. The most important use of animals for food production is to eat food which humans cannot eat. Hence grazers are much more important than pigs or poultry which often compete with humans for food.
2. Where grazers are used, fertilised or rotated pastures give much more yield than pastures grazed repeatedly with no nitrogen or other nutrients returned to them. Fertilisers other than manure and composted materials often unsustainable.
3. Plant production can often be combined with animal production, e.g. cattle/oil-palm, sheep/forestry.
4. Herbivores browse and graze!



永續性的幾個重要因素：

1. 世界資源的使用情況

如何在動物產品生產過程中更能善用現有資源？

1. 在食品製造業中，最重要的就是選擇那些不與人競爭食物的動物。因此草食性動物會比豬或家禽類還要重要，因為豬跟家禽會跟人類競爭食物。
2. 飼養草食性動物，使用肥料或輪流耕耘的牧場產量會比持續使用的放牧牧場高，因為營養以及氮都會回到土壤中而使產量提升。除了糞肥和堆肥，其他種施肥無法維持很久。
3. 植物性產品生產過程中可以跟動物性產品結合。例如牛／棕櫚油，羊／林業。
4. 食草動物是放牧吃草的！



2. Human Welfare: Human Health

Salmonella in eggs.

Campylobacter in chicken carcasses.

Avian influenza.

Bovine spongiform encephalopathy –BSE.



2. 人類福利：人類健康

雞蛋上的沙門氏桿菌

雞隻屠體的彎曲桿菌

禽流感

狂牛病 (BSE)



The BSE outbreak in Europe and now in North America, was initially mis-managed in several countries, including the U.K. One consequence has been the development of the risk assessment approach.

Another epidemic threat is tuberculosis but *Mycobacterium tuberculosis* transmitted from human to human, rather than *Mycobacterium bovis*

Avian influenza is probably the most important threat of a disease epidemic in humans. Highly pathogenic H5N1 influenza has not yet been modified to a form which is transmitted from human to human.



The H1N1 strain from Mexico originates from three North American and one Asian strain. As always, some of these have previously infected avian and porcine hosts but all are human strains and there is no evidence that the new strain came from pigs, hence it is not 'swine flu'. There has been transmission from human to pig, first reported in Canada.

The proportion of deaths from this influenza is not high, as initially reported by the media, but is in the normal range. Early deaths included more people of 20-40 than is usual but later deaths are of very young and weak people.

BSE在歐洲爆發而現在擴散到北美，最初在許多國家，包括英國，都處理不當。而其中一個後果已成為此風險評估方法的發展之一。

另外一個流行病的威脅則是結核病，且比起牛分支桿菌，結核桿菌會人傳人。

禽流感大概是人類中最具威脅性的重要流行疾病。H5N1為高致病性，目前尚未真正演變成以人傳人的傳染方式。



在墨西哥爆發的H1N1病毒株是來自於三種北美株與一種亞洲株。一如往常，這些屬人類病毒株曾感染過禽鳥和豬隻，但尚未有證據顯示新病毒株來自於豬隻，所以不稱「豬流感」。而病毒從人傳到豬的首例是在加拿大。

一開始媒體報導，此流感造成的死亡比例不算高，而是一般正常範圍。起初死亡案例多是介於年齡20-40的人，後來死亡的人變成是幼兒或是免疫力低弱的人。



Concern about human **diet** has large effects on animal production.

In particular, saturated fats increase risks of heart disease and farm livestock are a major source.

As a consequence, **fish production** is increasing rapidly.

The production of fish which consume vegetable matter, rather than predators like salmonids which have to be fed fish products, is likely to increase the most.

Farmed fish production is already greater in value than open water fish production and will overtake it in weight of fish within a few years.



人類**飲食習慣**對動物食品業有非常大的影響。

其中，飽和脂肪酸會增加心臟疾病的風險，而主要來源是來自家畜肉品。

結果導致**魚類食品供應**迅速增加。

不像需要餵食魚類產品的獵食者，例如鮭魚，只須餵食蔬食類的魚做成的食品可能增加最多。

養殖魚類的利益已超過開放水域的漁獲，並且將在幾年內，前者的產量會超過後者。

3. Animal Welfare

3. 動物福利

4. Unacceptable genetic change: conventional and genetic modification

Genetic and other changes in animal production in the last 50 years.

Examples of changes designed to improve general economic efficiency

Easier feeding and management

High stocking density

Fewer animal care staff

Less veterinary time per animal

Fewer, larger, faster abattoirs

4. 不可接受的基因變異：傳統與基因改造

近五十年動物食品基因與其他變異

旨在改善整體經濟效率的例子

容易餵食與管理

高飼養密度

減少動物保健人員

減少每隻動物看獸醫的時間

更少、更大、更快速的屠宰場

Examples of changes designed to improve general economic efficiency

Easier feeding and management

High stocking density

Fewer animal care staff

Less veterinary time per animal

Fewer, larger, faster abattoirs

Example of problem for animal

Individual housing

More disease

Problems missed

Disease etc. not treated

Longer journeys, poorer care

旨在改善整體經濟效率的例子

容易餵食與管理

高飼養密度

減少動物保健人員

減少每隻動物看獸醫的時間

更少、更大、更快速的屠宰場

動物的問題

個別隔離圍欄

更多疾病

看不見問題

未醫治

運載時間變長，照顧不佳

Examples of changes designed to improve efficiency of production per animal

Improved nutrition for growth

Improved nutrition for energy partitioning

Reduced energy expenditure by animals

Growth promoters

Growth promoters from bioengineering

Embryo transfer

Conventional breeding

Transgenic animal use

旨在改善每隻動物的產量效率變化案例

改進動物增長的營養

改善營養的能量分配

減少動物的能量消耗

生長促進劑

來自生物工程之生長促進劑

胚胎移植

傳統繁殖

使用基因轉殖動物

<i>Examples of changes designed to improve efficiency of production per animal</i>	<i>Example of problem for animal</i>
Improved nutrition for growth	Growth too fast
Improved nutrition for energy partitioning	Muscle : bone ratio wrong
Reduced energy expenditure by animals	Confinement
Growth promoters	Leg problems
Growth promoters from bioengineering	More production-related disease *
Embryo transfer	Parturition problems
Conventional breeding	Harmful characteristics
Transgenic animal use	Biological system changes
Example of E.U. approach and decisions	

<i>旨在改善每隻動物的產量效率變化案例</i>	<i>動物的問題</i>
改進動物增長的營養	長太快
改善營養的能量分配	肌肉：骨頭比例錯誤
減少動物的能量消耗	被監禁
生長促進劑	腳出現問題
來自生物工程之生長促進劑	更多跟生產有關的疾病*
胚胎移植	分娩問題
傳統繁殖	有害特徵
使用基因轉殖動物	生物系統改變
Example of E.U. approach and decisions	

Effects of bovine somatotrophin (BST) usage on dairy cow welfare

Increase in risk of clinical mastitis above risk in non-treated cows as demonstrated using meta-analyses or large data-sets: five studies 15-45%, 23%, 25%, 42%, 79%.

Foot disorders: large scale study with multiparous cows showed 2.2 times more cows affected and 2.1 times more days affected.

Pregnancy rate dropped from 82% to 73% in multiparous cows and from 90% to 63% in primiparous cows.

Multiple births substantially increased.

Injection site: severe reactions in at least 4% of cows.

(Report of E.U. Scientific Committee on Animal Health and Animal Welfare, adopted 10th March 1999)

使用牛生長激素(BST)對乳牛福利的影響

添加生長激素的乳牛相較於未添加的乳牛，在臨床上罹患乳腺炎增加的風險；五個使用代謝分析或大量數據的研究。

足部失調：對一胎多子的乳牛做大規模數據調查顯示，增加2.2倍的感染率，並增加2.1倍的感染天數。

一胎多子的乳牛受孕機率從82%降到73%，而初次生產的乳牛受孕機率從90%降到63%。

多胞胎現象大幅上升。

注射部位：至少有4%的乳牛會起嚴重的反應。

(Report of E.U. Scientific Committee on Animal Health and Animal Welfare, adopted 10th March 1999)

5. Environmental effects

Agriculture generally reduces biodiversity.

Where wild or semi-wild areas are cleared for animal production, substantial harm can be done to populations of animals and plants.

However, the creation of significant areas of nature reserve is demanded by the public in most countries and preservation of wildlife can result in greater income through eco-tourism than would have been possible by farming.

Purchase of land to conserve natural resources can often stimulate local economies and lead to a sense of regional pride which would not have existed if low level animal production had continued.

A major area of development is farming systems with better biodiversity.

5. 環境影響

農業普遍減少了生物多樣性。

由於野生或半野生地區改建成畜產業，導致了動植物群族的數量受到嚴重損害。

然而，在大多數國家受民眾要求建立了自然保護園區，野生動物園區可以透過生態旅遊，得到比農田種植利用多的收入。

購買土地以保護自然資源通常可以刺激當地的經濟發展，增加地方的自豪感，但低水平畜牧業如果持續下去，就沒有這個可能。這是在水準低的畜牧業環境不會存在的。

發展的重點，是：有較好生物多樣性的畜牧系統。

Pollution resulting from animal agriculture can be harmful in relation to water supplies, loss of plant nutrients, greenhouse gas production and increased human disease.

The animal producer should pay any costs of pollution.

Wherever possible, animal waste should be efficiently recycled.

Antibiotic use and use of other medicines can cause health and environmental problems.

A recent urgent problem is a cattle medicine killing vultures.

The numbers of vultures in India have declined by 97% in 12 years. This is a consequence of poisoning by the painkiller Diclofenac. The Indian Government recently banned its use.

畜牧業帶來的污染會對以下造成損害：供應的水質，植物營養流失，溫室氣體排放，和人類罹患疾病機率上升。

畜牧業者應該要不計任何代價解決汙染問題。

在任何可能的情況下，動物排泄物應該要有效率地循環利用。

抗生素和其他藥物的使用會導致健康及環境問題。

最近一件迫切需解決的問題是用在牛隻身上的藥物殺害了禿鷲。

在印度，大量的禿鷲在12年內減少了97%。這是因為止痛藥雙氯芬酸鈉（Diclofenac）的使用毒死了他們。印度政府最近下令禁止使用。

6. Preserving Rural Communities

Animal agriculture is associated with many traditions and ways of life for people.

Many human communities exist as they do as a consequence.

Modern farming methods can change this. Do people want this?

Some government actions have the objective of preserving rural communities and encouraging traditional methods of keeping animals. An agricultural system could be restricted geographically or prohibited for such reasons.

Fair trade is now a major factor for consumers.
Third world producers should not be exploited.

Sustainability depends on acceptability.

6. 農田社區的保存

畜產業與人們傳統生活方式密不可分。

許多人類社區是因為他們從事畜產業而存在。

現代的畜牧方式可能改變此一切。這是人們想要的嗎？

一些政府會有客觀的農田社區保護行動，並鼓勵傳統畜牧飼養方式。某種農牧系統可能會受地理上的限制，或因這些理由而被禁止。

現在，對消費者來說，公平交易是一個重要的因素。
第三世界的業者不應該被剝削。

永續性取決於接受度。

General Conclusions

In relation to animal production throughout the world, there will be increasing demand from consumers for the avoidance of adverse effects on human welfare, animal welfare and the environment.

In some cases, maintaining the viability of human communities is also considered to be important.

Some important factors for sustainability and product quality are:

1. Usage of world resources
2. Human welfare: human health
3. Animal welfare
4. Acceptability of genetic change, including genetic modification
5. Environmental effects
6. Rural Communities, including Fair Trade

Animal welfare has been developing rapidly as a scientific discipline.

一般性結論

有關於全世界的畜牧產品，越來越多消費者會要求避免對於人類，動物福利及環境造成不良影響。

在某些情況下，維持人類社區的活性，也被視為重要。

永續性和產品品質的一些重要因素：

1. 世界資源的使用情況
2. 人類福祉：人類健康
3. 動物福利
4. 基因變化的可接受度, 包括基因改造
5. 環境影響
6. 農田社區，包括公平交易

動物福利已迅速發展成為一門科學學科。

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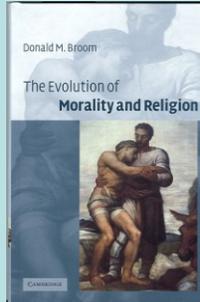
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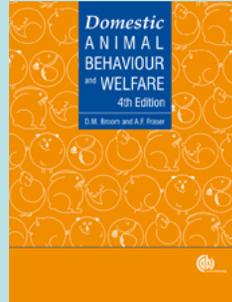
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**Recent developments in animal
welfare science: research indicators
and welfare outcome indicators on
farm and at slaughter**



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**新近動物福利科學的發展：
農場及屠宰場的研究指標
及福利表現指標**



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Current and future areas of activity in welfare research:

- Disease and welfare
- Relating intensity and duration
- Assessing strength of preference
- New indicators of good and poor welfare
- On farm or other in situ indicators of welfare - Welfare Quality/AWIN
- Assessment of risk of poor welfare or likely benefit of good welfare
- Cognition and sentience
- Welfare in relation to sustainability and product quality

Disease and welfare. With disease challenge, as well as with other challenges, difficult or inadequate adaptation results in poor welfare.



Health is an important part of welfare.
e.g. osteoarthritis in cats and dogs



e.g. sole ulcer in cows

目前及未來福利研究的相關領域：

- 疾病及福利
- 疼痛的強度及持續度
- 偏好強度的評估 Assessing strength of preference
- 良好與不良福利的新指標
- 農場及其他場所的福利指標 - 福利品質/AWIN
- 評估福利不良的風險或良好福利的可能助益
- 認知能力及情識 (sentience)
- 福利問題與產業永續及產品品質的關連

疾病及福利—適應困難或不良都會造成福利的不良，產生疾病及其他問題



健康是福利很重要的一部分
例如犬貓的關節炎疾病



例如牛隻的腳蹄病

In addition to animal welfare science, there have been developments in ideas about the evolution of morality and to the limitations of arguments based on competition in societies.



Most actions involve: benefit to,
tolerance of,
benefit from,
or cooperation with others.

Logically, these must be more important than competition because societies are relatively stable.

除了動物福利科學之外，道德的進化及限制社會競爭的辯證等想法也在發展中



大多有關：

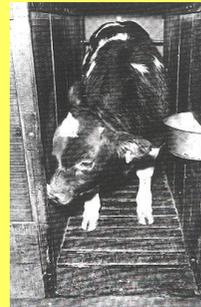
有利於
容忍
受益於
或相互合作

邏輯上，這些特質都應該比競爭更重要，因此才有相對穩定的社會。

How should we relate duration of a state and welfare?

There are differences between the welfare indicators that are most useful for assessing welfare according to how long the positive or negative welfare goes on.

Short-term measures like heart-rate and plasma cortisol concentration are appropriate for assessing welfare during handling or transport but not during long-term housing.

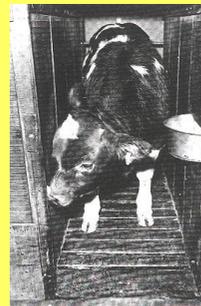


Behaviour, immune system and disease measures are more appropriate for long-term problems.

如何將一個狀態的持續度與福利連結?

已建立多種不同的福利指標，用來衡量正面及負面狀態時間的長短，對福利的評估非常有用。

短時間的驅趕及運送，可從心跳及皮質醇濃度衡量出福利狀態，但此方式不適用於長期居住狀況的評估。



長期問題的評估應衡量行為、免疫系統和疾病

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Welfare over longer periods is sometimes referred to as quality of life. This term is much used by clinicians but it means welfare.

Over any time-scale, measures of severity or intensity of effect on welfare have to be related to the duration of the state.

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長期問題的評估應衡量行為、免疫系統和疾病。

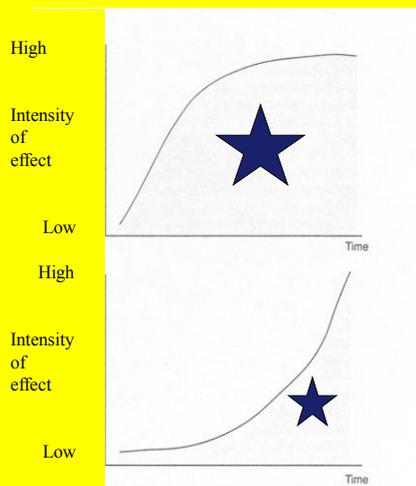
較長時間的福利問題有時也稱為生活（生命）品質，較常使用在醫療人員之間，亦即福利。

無論時間長短，嚴重度及強度對福利產生的效應衡量，應與持續狀態相互連結。

When welfare is evaluated, the relationship between intensity and duration should be taken into account (modified after Broom 2001).

Where there is an adverse impact, e.g an experimental procedure or stunning before slaughter, the area under the plot of intensity/severity against time is the **magnitude of poor welfare**.

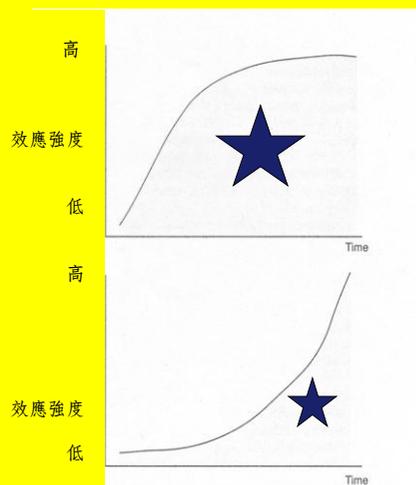
Where the effect is a benefit, it is the intensity of positive effects that is measured and the **magnitude of good welfare** is determined.



在評估福利時，強度與持久度之間的關係必須被納入考量 (modified after Broom 2001)

例如實驗操作或屠宰前的致昏，其負面影響的強度/嚴重度，相對於時間，是量測**福利不良**的主要。

當有助益的效應發生時，則衡量正面效應的強度，以決定**良好福利**的狀態



Assessing strength of preference

How do we find out from animals what they need?

What is preferred?
(choice of floors)



How hard will the individual
work for a resource?
(lift weighted door)



評估偏好的強度

我們如何知道動物需要什麼？

偏好什麼？
(選擇何種地面)



會花多少力氣以獲取某種資源
(拉起重力門)



Terminology used in motivational strength estimation

Resource – commodity or opportunity to perform activity.

Demand (as measured) – amount shown of action which enables resource to be obtained.

Price – amount of that action required for unit of resource.

Income – amount of time or other variable limiting that action

Price elasticity of demand – proportional rate at which consumption or demand changes with price.

Consumer surplus – a measure of the largest amount which a subject is prepared to spend on a given quantity of the resource. It corresponds to an area beneath an inverse demand curve.

動機強度估算所使用的專有詞彙

資源 – 物品或進行某種活動的機會

需求 (經過測量) – 為獲得資源所採取的行動量

代價/價格 – 取得單位資源所需的行動量

所得 (Income) – 限制該行動的時間及其他變數

需求的代價/價格彈性 – 衡量價格隨著消費或需求轉變所反應的彈性程度

消費者剩餘 – 衡量個體願為某資源付出的最大值

顯示於下圖逆需求曲線的白色區塊中

Demand curve



The area under this inverse demand curve is the consumer surplus of the quantity z .

需求曲線



逆需求曲線下的區域代表 z 數量的消費者剩餘



Mink were trained to perform operants to reach: an extra nest, various objects, a raised platform, a tunnel, an empty cage and a water pool to swim in.

The swimming water was given very high priority by the mink.
Mason et al (2001) Nature, 410, 35-36.



訓練貂經過操作行為可獲得：更多巢穴、不同物品、升起的平台、隧道、一個空籠子、及可游泳的水池

貂給予游泳水池最優先順位
Mason et al (2001) Nature, 410, 35-36.

New indicators of good and poor welfare

How can we use physiological measures effectively?

What do stereotypies and other measures of abnormal behaviour tell us?

Direct measures of brain function: how are they related to welfare?

Evaluate the impact of adverse environmental conditions:

Assymetry of development.

Changes in physical development,
e.g. tooth growth.



Also, how is pain related to other welfare indicators? – New EU research project.

良好福利與不良福利的新指標

我們如何有效運用生理測量？

我們可以從違反常態的刻板及不正常行為裡學到什麼？

直接測量腦功能：如何與福利連結？

評估負面環境條件的影響：

不對稱的成長

生理成長的改變
例如：牙齒生長



同時，疼痛如何與福利指標連結？
—新的歐盟研究計畫

New indicators of good and poor welfare

Physical impact of the environment.

We still know relatively little about the effects on welfare of:

high and low temperature,
starvation,
noxious gases.

Aspects of the social impact of the environment.

We still know relatively little about the effects on welfare of:
fear of attack by a conspecific or predator,
lack of social contact (for many species).

良好福利與不良福利的新指標

環境對身體的影響

我們仍然不夠了解下列事項對福利的效應：

- 高低溫
- 飢餓
- 有毒氣體

環境的社會影響面向

我們仍然不夠了解下列事項對福利的效應：

- 害怕被同種或獵食者攻擊
- 缺乏社交聯繫（對許多物種而言）

On farm or other in situ indicators of welfare	Genetic selection as well as husbandry
Lameness in cattle.	
Leg problems of broilers: difficulties in walking.	Index specifying levels of difficulty in walking.
Extent of mastitis and reproductive problems of dairy cows.	
Extent of stereotypies in confined animals, broken bones in hens, bruising.	
<u>Welfare Quality information: welfare outcome indicators, animal-based.</u>	
Maximum can be specified, e.g. 10% with detectable lameness or mastitis, 1% stereotypies, broken bones, severe bruising or hock burn.	
Assessment of risk of poor welfare or likely benefit of good welfare	
Risk assessment in relation to disease, welfare.	List factors (hazards) Calculate exposure Estimate uncertainty
Good impact of particular exposures – benefit.	Quantitative/ qualitative.

農場上或其他福利的在地 (in situ) 指標	基因篩選及畜牧管理
牛隻跛腳	可明確顯示行走困難的指數
肉雞的腳：行走困難	
乳牛乳房炎及繁殖能力的問題	
囚禁動物的刻板行為及其程度/蛋雞骨折、瘀青	
福利品質資訊：福利表現的指標，以動物為主體	
指出最大值	
例如10% 罹患跛腳或乳房炎	
1% 刻板行為、骨頭斷裂、嚴重瘀青或跗關節灼傷 (hock burn)	
評估不良福利的風險，及良好福利的助益	
福利與疾病之間的風險評估。	因素列表 (有害) 表現的計量
好的影響：明顯可見的助益	不確定性的估計 質化/量化

Cognition and sentience

Which animals should be protected and to what degree should they be protected?

For most people, animals with awareness are thought more worthy of protection.

A **sentient being** is one that has some ability:

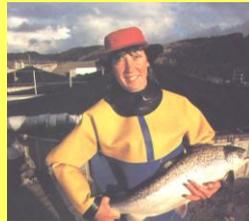
to evaluate the actions of others in relation to itself and third parties,

to remember some of its own actions and their consequences,

to assess risk,

to have some feelings and

to have some degree of awareness.



However, the term welfare, although not applicable to inanimate objects or plants, is relevant to all animals because they have a nervous system, not just to sentient animals.

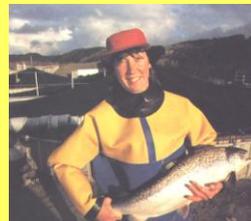
認知與情識 (sentience)

哪些動物需要被保護，以及保護到什麼程度？

對大多數的人而言，具有「情識」的動物更值得被保護

一個具有「情識」的生物，意指其具有下述能力：

- 能評估他者的行動，對自身及第三者的關係
- 能記憶自己所做的行動及其後果
- 能評估風險
- 具有某些感覺
- 具有某程度的覺察能力



雖然福利一詞並不適用於無生物或植物，然而不只是「情識」動物，所有具有神經系統的動物都可適用

People have long appreciated the sentience of various domestic and other animals and have often thought of them as an example to follow or a friend who would help, rather than just as a resource object.

However, a rabbit is viewed differently according to whether it is:

a family pet,
a laboratory animal,
an animal kept for meat production, or
a wild animal that eats your crops.

This is not scientifically sound.

A rabbit is a rabbit and each one feels pain or has cognitive function.

人們長期以來都很珍惜家畜禽和其他動物所具有的情感和意識（情識），也常將這些動物視為學習的對象，或會幫助人類的朋友，而不只是一個可提供資源的物品。

然而兔子則依下列不同情況，而有不同的待遇：

- 家庭寵物
- 實驗動物
- 飼養做為肉品
- 會啃食你家農作物的野生動物

這聽起來並不科學

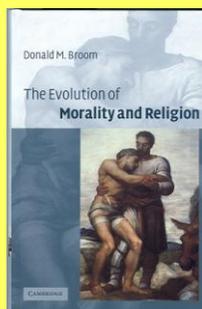
兔子就是兔子，每一隻都會感到痛苦，也具有認知功能

Animal welfare science is a key topic for providing information that the public wants.

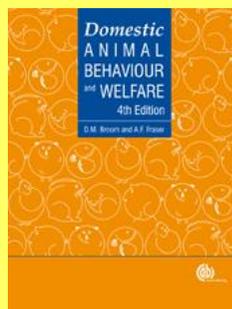
Understanding how individuals cope with the world in which they live is a major area of fundamental science, for humans as well as for other species.

There is much to do!

Broom, D.M. 2003.
The Evolution of Morality and Religion,
pp 259. Cambridge University Press.



Broom, D.M. and Fraser, A.F. 2007.
Domestic Animal Behaviour and Welfare,
4th edn. pp. 438. Wallingford: CABI.

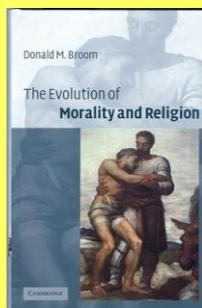


動物福利科學是提供社會大眾所需資訊的重要課題

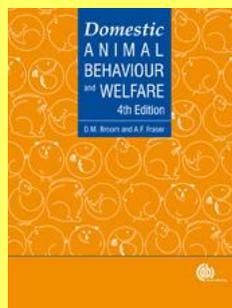
對人類及其他物種，了解個體如何因應其居住的環境是基礎科學的主要領域

還有許多仍待努力！

Broom, D.M. 2003.
道德及宗教的演化
pp 259. Cambridge University Press.



Broom, D.M. and Fraser, A.F. 2007.
馴養動物的行為及福利
4th edn. pp. 438. Wallingford: CABI.



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Proc. 15th Annual Conference of the Reading University Agricultural Club, 1981, ed. J.Uglow, 1-9.

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Sentience, Welfare and Obligations to Animals



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動物情識、福利和義務



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How should we describe what should or should not be done to other individuals?

We should describe the obligations of the actor rather than the rights of the subject. (Assertions of rights and freedoms can cause problems.)

We all have obligations not to harm others.

If we keep or otherwise interact with animals, we then have obligations in relation to their welfare.

In the United Kingdom Animal Welfare Act 2006 each person who keeps or is responsible for animals has a duty of care. They can be prosecuted if they do not care for the animal properly.

哪些事情能做，哪些不能？關於對待其他物種，我們該如何描述？

我們應該描述一位行為者該有的義務，而非行為對象本身的權利。（權利與自由的主張會導致問題）

我們每個人都有義務不去傷害其他生命。

如果我們飼養動物，或必須跟動物互動，那麼對於他們的福利我們就有義務在身。

英國動物福利法（2006）：每個飼養動物者，或必須對動物負責的人，都有照顧牠們的義務。如果不妥善照顧動物，可予起訴。

We are more likely to treat as deserving of moral consideration those identified as “us” than those considered to be “them”.

Categories of “us”.

1. Includes only individuals readily recognised as close relatives.
2. A wider range of individuals is included if “all of those who know who I am” is the category.
3. Still wider is the group who “might have access to the same information that I have”,
or
4. All sentient beings who share characteristics with me.

我們比較可能對於稱之為“我們”的群體，給予相較於被稱之為“他們”的群體，更多道德上的對待與考量。

可以分類為“我們”的是：

1. 包括那些天生就被視為親人的個人。
2. 廣泛一點的是，“那些知道我是誰的人”。
3. 再更廣一點，是“那些有管道接觸跟我所知一樣訊息”的族群。

或者

4. 所有和我有共同特徵的生物。

The origin of the term sentience involves having a capacity for feelings and hence for the associated level of awareness.

A sentient being is one that has some ability:

to evaluate the actions of others in relation to itself and third parties,

to remember some of its own actions and their consequences,

to assess risk,

to have some feelings and

to have some degree of awareness.

情識（sentience）這個字的原意，包含有能力「感覺」，以及與之相關、一定程度的察覺能力（awareness）。

具有情識的生物，具有以下部分能力：

- 有能力評估他者的行為是否關係到自身或第三者。
- 有能力記得部份自身行為與其後果。
- 有能力評估風險。
- 有能力去感覺。
- 有某種程度的察覺能力。

People have long appreciated the sentience of various domestic and other animals and have often thought of them as an example to follow or a friend who would help, rather than just as a resource object.

However, a rabbit is viewed differently according to whether it is-
a family pet,
a laboratory animal,
an animal kept for meat production,
or a wild animal that eats your crops.

This is not scientifically sound.

A rabbit is a rabbit and each one feels pain or has cognitive function.

人們早已發現各種家畜禽和其他動物具有覺知能力，並時常以他們作為借鏡或視為會助人的朋友；而不只是一種可用的資源。

然而，一隻兔子會被如何看待，端看牠是
一隻家寵，
實驗動物，
食用動物，
或是會吃農作物的野生動物。

這很不科學。

兔子就是兔子，而每一隻兔子都能感覺到痛或是具有認知能力。

Within this category of sentient animals, more sophisticated brain processing will provide better opportunities for coping with some problems.

Two examples from our work:

某些具有「情識」的動物，擁有更複雜的大腦運作，可以提供更好的機會去面對一些問題。

從我們的研究可以舉出兩個例子：

Awareness of own learning / achievement: emotional responses

Hagen (CAWA) young cattle showed behaviour and heart-rate response at the moment of learning.



We had a similar result in a study on sheep learning.

It may be that they were aware of their own success in solving a problem.

Eureka!

對自身學習與成就的察覺：情緒反應

在學習的那一刻，表現出行為與心跳反應。



在研究羊的學習中，我們也有類似的發現。

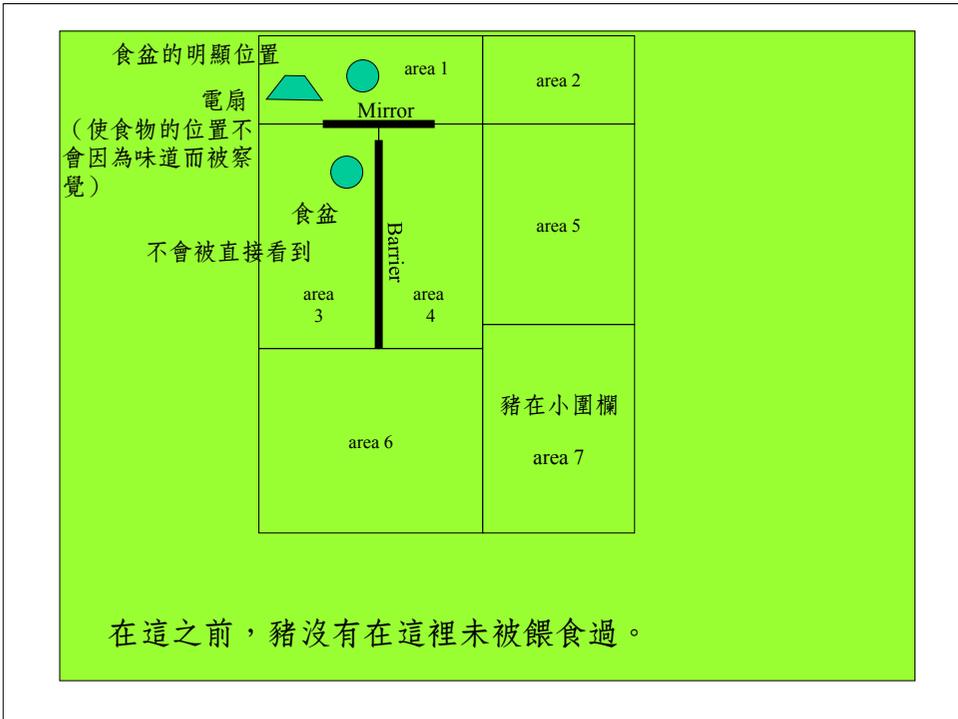
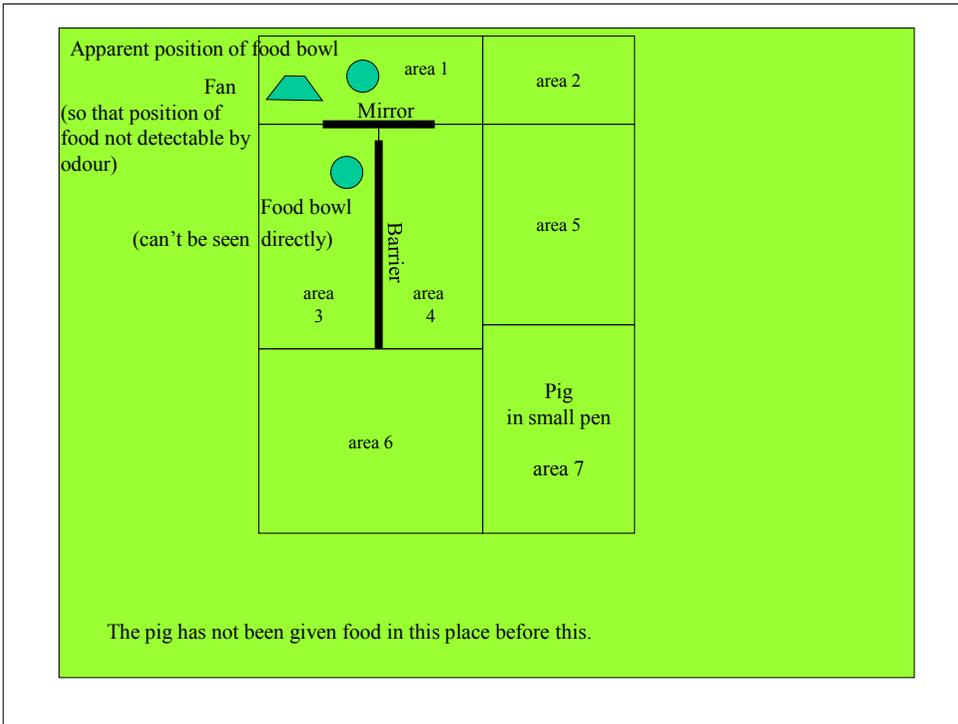
這可能是因為他們意識到自己成功解決問題了一心想「讚啦」！

Can pigs use information from a mirror?

1. Pigs naïve to mirror shown food behind a barrier, visible only in mirror:
9 / 11 pigs went behind the mirror to look for it.

豬可以運用從一面鏡子得到的訊息嗎？

1. 第一次見到鏡子的豬，只能從鏡中看到放在障礙物後面的食物；11隻豬裡有九隻會跑到鏡子後面去找食物！



Can pigs use information from a mirror?

1. Pigs naïve to mirror shown food behind a barrier, visible only in mirror:
9 / 11 pigs went behind the mirror to look for it.
2. Give the pigs five hours of experience in a room with a mirror.
They look at it.



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2. 給豬在有鏡子的房間裡待五個小時。他們會看鏡子。



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1. Pigs naïve to mirror shown food behind a barrier, visible only in mirror:
9 / 11 pigs went behind the mirror to look for it.
2. Give the pigs five hours of experience in a room with a mirror.
They look at it.
3. Pigs shown food behind a barrier, visible only in mirror:
7 / 8 pigs went behind the barrier, away from the mirror and found it.

豬可以運用從一面鏡子得到的訊息嗎？

1. 第一次見到鏡子的豬，只能從鏡中看到放在障礙物後面的食物；11隻豬裡有9隻會跑到鏡子後面去找食物！
2. 給豬在有鏡子的房間裡待五個小時。他們會看鏡子。
3. 豬只能從鏡裡看到放在障礙物後面的食物：
8隻豬裡有7隻會不管鏡子，而跑到障礙物後面找食物。

BUT – having a high level of cognitive ability helps in dealing with problems.

There seem to be means of dealing with pain which humans have but fish do not.

As a consequence, a certain degree of pain may cause worse welfare in fish than in humans.

This argument would also be valid for other causes of poor welfare.

但，擁有高度認知能力可幫助處理問題。

這似乎代表人類可以解決疼痛帶來的問題而魚類卻不行。

因此，某種程度的疼痛可能會導致魚的福利比人類的差。

這個論點對於其他造成較差福利的原因也是成立的。

It also seems likely that more complex brains allow more possibilities for pleasure, which contributes greatly to good welfare.

The same type of human action may sometimes be more cruel if inflicted on a simpler animal than on a human or other more complex animal.

這也似乎可以說，越複雜的腦越有感覺愉悅的機會，而對好的福利大有貢獻。

相對於人類或其他較「複雜」的動物，同樣形式的人類行為，套用在較「簡單」的動物上，有時可能更殘酷。

In recent years, public pressure in relation to codes of practice, laws and the enforcement of laws have increased in all countries concerning:

human health,

animal welfare,

impact on the environment

In Europe, one of the big pressures for laws etc. in these areas has been the view that it is uncivilised to:

allow people to become sick,

or animals to be treated badly,

or the environment to be damaged.

近年來，各國基於公眾壓力下，相關的實務守則，法律，以及執法，已經陸續增加，包括：

— 人類健康

— 動物福利

— 對環境的影響

在歐洲，法律的要求之一，是下列這些狀況會被視為野蠻、不文明：

讓人民生病，

讓動物受到不好對待，

讓環境受到破壞。

Animal welfare problem areas

Animals

Deliberate ill-treatment	all animals used by man
Neglect	all animals kept
Poor housing and management	all animals kept
“Sport”	Pets, Farm, Working, Wild
Breeding	Pet, Farm, Lab.
Procedures and operations	Pet, Farm, Lab.
Transport	especially Farm and Circus
Slaughter/Killing	especially Farm but also Pet, Lab.

動物福利問題相關領域

Animals

蓄意虐待	所有為人類所用的動物
忽視	所有被人飼養的動物
惡劣環境和管理不佳	所有被人飼養的動物
競技活動	寵物/農場動物/勞役動物/野生動物
繁殖	寵物/農場動物/實驗動物
程序與操作	寵物/農場動物/實驗動物
運送	特別是農場動物與展演(馬戲團)動物
屠宰/殺死	特別是農場動物/寵物/實驗動物

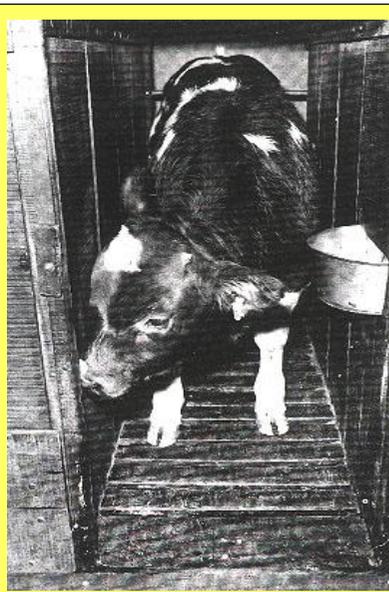


Old English Sheepdog brought to RSPCA

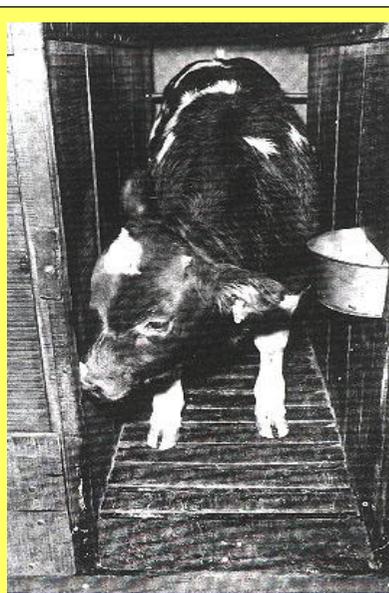


被RSPCA救援的英國古代牧羊犬

Veal calf in crate



在圍欄中的「小牛(肉)」







Chickens: breast blisters and hock burn



雞：胸部上的水泡和燒傷的跗關節



Killing trout by leaving to suffocate in air



讓鱒魚窒息死亡



Evidence for increased concern about animal welfare.

- Letters from the public, media coverage.
- References in parliamentary discussions and government statements.
- Requests for scientific evidence concerning animal welfare.
- Activity of scientific and other advisory committees.
- Funding of scientific research on animal welfare.
- Increased teaching and conferences.
- More legislation

Members of the European Parliament receive more letters on animal welfare than on any other subject.

These concerns and actions in Europe are echoed in many other countries. Animal welfare research, national committees and laws are developing around the world.

The O.I.E. is now playing a part in this.

Multinational food companies are also having important effects.

動物福利近年來受關注的跡象

- 大眾來信與媒體報導
- 議會討論與政府聲明的文獻
- 有關動物福利在科學證據上的需求
- 科學或其他諮詢委員會的活動
- 有關動物福利的科學研究經費
- 漸增的教學與研討會
- 更多相關法律成立

比起其他議題，歐洲國會議員，收到更多提及動物福利的信件。

這些在歐洲出現的關切與行動，也在其他國家引起迴響。動物福利研究，全國性的委員會與相關法律，都在世界各地漸漸發展中。

世界動物衛生組織（OIE）也參與其中。

跨國的食品公司也有重要的影響力。

Public opinion survey in France done by government researchers.

75% of people said that concern about animal welfare affected their purchase of veal and eggs.

Study carried out by Irish meat producers organisation.

34% of schoolgirls questioned in Ireland said that they avoided eating meat. The reasons given were:

53% concern about animal welfare,

29% concern about nutrition.

法國政府研究人員做了民眾意見調查。

其中75%民眾表示，對動物福利的關切，影響了他們購買牛肉與雞蛋的決定。

愛爾蘭肉類產品組織做的研究顯示

34%的受訪女學生拒絕吃肉。

理由是：

因為關心動物福利（53%）

因為關心營養（29%）

Factors affecting the welfare of animals include:

the attitudes of the general public - much affected by education about animal functioning, behaviour etc. from schools and media,

responses of retailers, food producers to public pressure,

laws produced by governments,

international trade agreements.

影響動物福利的因素有：

一般大眾的態度—大部分的影響來自於學校，或媒體所傳遞，有關動物的功能、行為等。

零售商與食品生產者，受到輿論壓力而給予的反應。

政府制定的法律。

國際貿易協定。

Organisations producing: recommendations,
laws,
codes of practice.

1. Governmental: Council of Europe, European Union, Member States of E.U. and various countries throughout the world.
In the E.U. - European Commission, European Food Safety Authority EFSA.

On a world scale: O.I.E. (Organisation International des Epizooties
= World Organisation for Animal Health).

2. Food retail companies

3. Food producing companies

4. Animal protection societies, e.g. Freedom Foods (RSPCA)
Compassion in World Farming

建議：組織
法律
實務守則

1. 政府方面：歐洲理事會，歐洲聯盟及其會員國和其他世界各個國家。

 歐盟：歐洲委員會，歐洲食品安全管理局局。

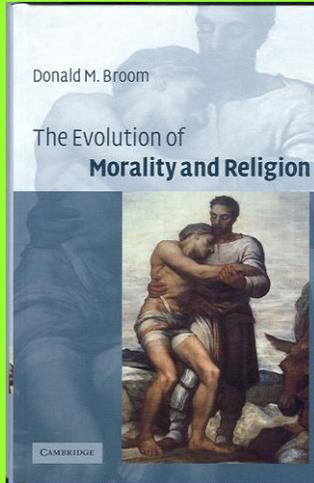
 全球性組織：世界動物衛生組織

2. 世界零售企業

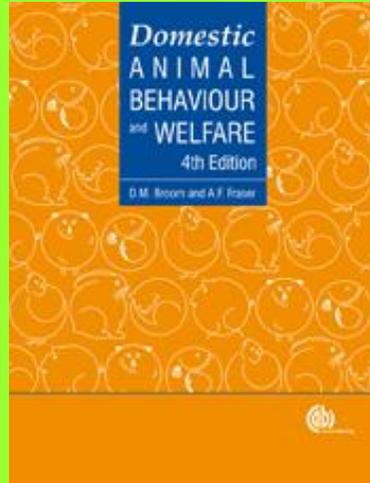
3. 食品生產公司

4. 動物保護組織：如「英國防止虐待動物協會（RSPCA）」，「世界慈善農業組織（CIWF）」等。

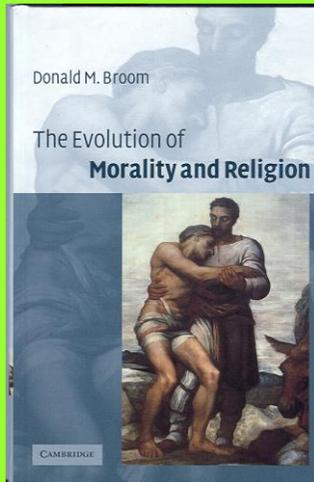
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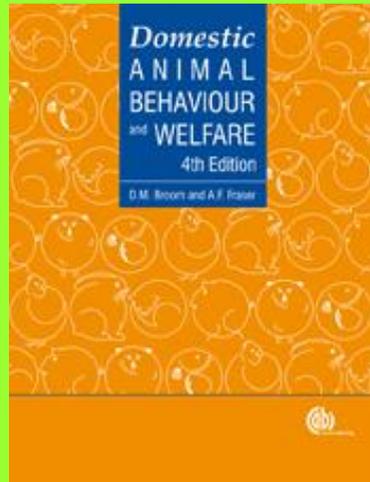
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Welfare in Wildlife Management

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野生動物管理中的動物福利

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Killing animals - pests, unwanted animals, animals for fur,etc. - is an ethical issue.

Poor welfare is an ethical issue.

Damaging the environment is an ethical issue.

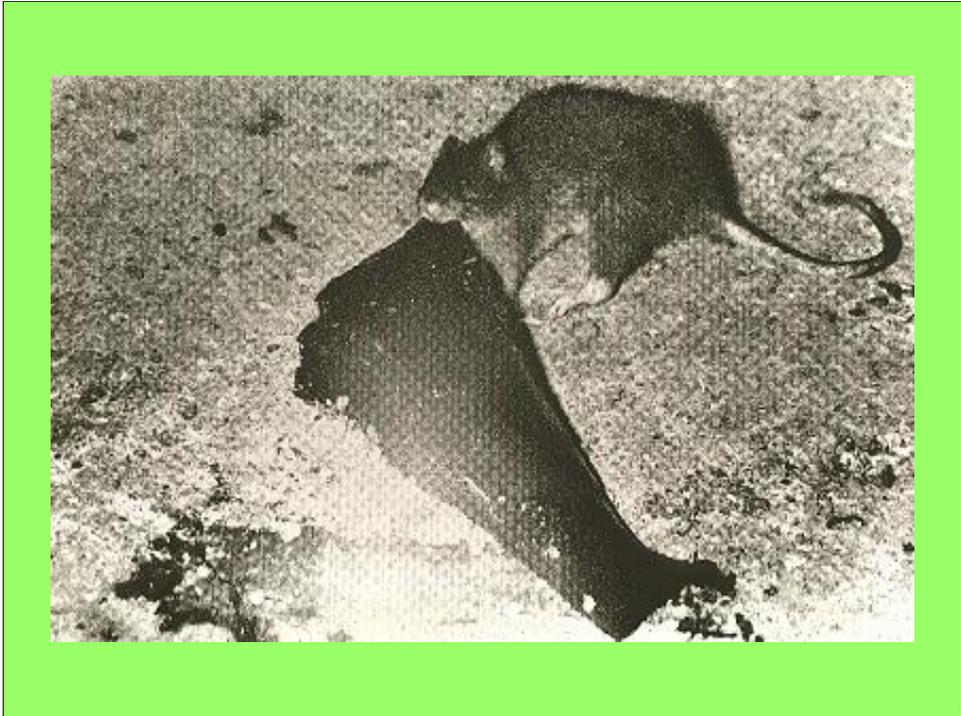
We have moral obligations towards animals which we use.

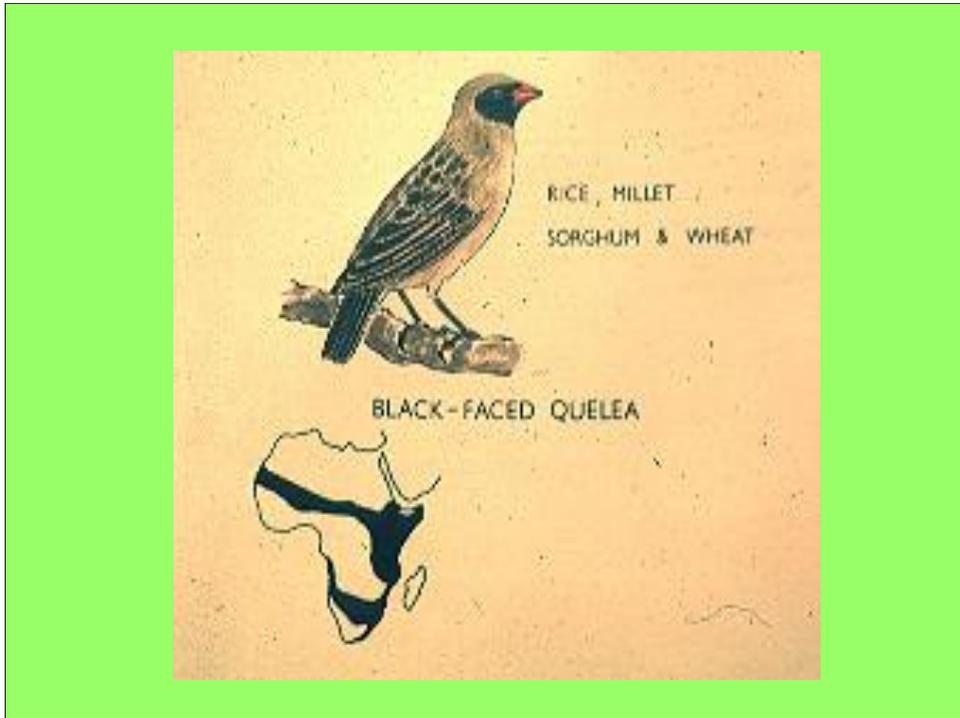
殺害動物－「有害」動物、遺棄動物、動物毛皮
…等－是道德問題。

不健全的福利是道德問題。

破壞環境是道德問題。

對於我們所使用的動物，我們應盡道德上的
責任。





Welfare ends at death.

Hence instantaneous death is not a welfare issue.

But the effects of attempts to kill, e.g. by trapping, poisoning, hunting with dogs, shooting, may be to cause very poor welfare.

福利隨著死亡終結。

因此，瞬間死去不是福利問題。

但試圖透過誘捕、毒殺、獵狗狩獵、槍殺…等行為殺死動物，就可能造成不良的福利。

Effects of killing methods on welfare depend on a function of severity and duration.

In some countries, poisons must be tested to check the degree of pain and suffering caused.

Anti-coagulants cause local haemorrhages and these are very painful for a long time in humans.

以福利而言，殺死動物的方式，依其效果的嚴重性及持續性，而有所不同。

在某些國家，毒物必須先經過檢測，測試其所產生的痛苦程度。

抗凝血劑會造成局部出血，並對人類產生長期的痛苦。

Gregory et al found that potassium cyanide killed brush-tailed possums with signs of poor welfare lasting for a mean of six minutes.

The severe effects of 10-80 lasted for more than 10 hours.

The effects of strychnine are very severe and very long in duration.

Gregory 等人發現，用氰化鉀毒殺刷尾負鼠（brush-tailed possums），導致動物福利不良的平均時間長達6分鐘。

其中「10-80」這種毒藥影響較嚴重的持續超過10小時。

士的寧（strychnine）的效果非常強且時效很長。



Bateson and Bradshaw (1997) studied red deer (Cervus elephas) shot or hunted by dogs.

Measure	Deer stalked and shot	Deer hunted with dog pack
Plasma cortisol nmol/l	<3	197
%LDH 5	3	28

Bateson和Bradshaw (1997) 研究被槍殺或獵狗獵殺的赤鹿 (Cervus elephas)

單位	追蹤／槍殺鹿隻	以獵狗群狩獵
皮質醇 nmol/l	<3	197
%LDH 5	3	28

Scaring or excluding pests is often the best control method.

Removing resources can also be effective.

In each case, full costs, such as the number of individuals which starve, should be assessed.

驚嚇或驅趕「有害動物」通常是最好的控制方法。

將資源「遷移」(removing)也十分有效。

在任何情況下皆應評估有饑餓情形的個別動物數量。









**Conservation efforts may improve animal welfare,
and vice versa.**

**However, there may be conflict between the two
objectives.**

保育工作也許可以改善動物福利，反之亦然。
然而，兩者間也可能會有衝突。





Conflict between promoting conservation and promoting good welfare.

1. Breed endangered species: most captive conditions

推廣保育及促進良好福利間的衝突

1. 繁殖瀕臨絕種動物：多為圈養。

Conflict between promoting conservation and promoting good welfare.

2.Preserving land for hunting or shooting.

3.Allowing cats to roam.

4.Keep all farm animals free range.

5.Wild animal rescue.

6.Test medicines and pesticides.

7.Nature reserve and wild population management.

推廣保育及促進良好福利間的衝突

2.保留狩獵區或射擊區。

3.讓貓四處遊走。

4.自由放養農場動物。

5.拯救野生動物。

6.試驗藥品及殺蟲劑。

7.控管野生數量及設立自然保護區。

**Nature reserve and wild population management:
some effects on welfare.**

**Kill, scare, exclude, prick eggs, translocate, mark,
restrict movements.**

控管野生動物數量及設立自然保護區：
對於福利的影響

殺死、驚嚇、驅趕、刺蛋、遷移…標記、限制
行動。

Cetaceans all have complex brains.

Cetaceans of various species have learned to carry out a wide range of actions whilst performing displays for human entertainment.

Dolphins have been shown to be able to understand what they see in a mirror. They responded appropriately to marks put on their body.

(Reiss and Marino 2001)

Wild cetaceans learn how to avoid humans who cause disturbance to them.

The pain system in cetaceans seems to be the same as that in other mammals.

There is no evidence that being large or being small means being less aware.

Whales are sentient animals.

鯨豚類都有複雜的頭腦。

各種鯨豚在為人類提供娛樂節目時，都被訓練表演各式各樣的動作。

實驗證明海豚可以明白，牠們在鏡子裡看到的是什麼，對於自己身上標記的反應，也很適切。

(Reiss and Marino 2001)

野生鯨豚知道要如何避開干擾它們的人類。

鯨豚身上的痛覺感知系統和其他哺乳類動物一樣。

沒有證據顯示，它們的感知系統會因為體積大小而有所差異。

鯨魚是有感知的動物。

Scientific assessment of effects on whale welfare:

1. Effects of sounds and other human activity on communication and welfare.

For example, whales are known to change behaviour in response to boat noise (Nowacek et al 2007).

2. Effects of survey work, tissue sampling, marking procedures etc.

For example, Tezanos Pinto and Baker (2011) report little reaction to a small, projectile biopsy lance, no evidence of later avoidance and the usual, relatively slow wound healing.

科學評估對於鯨魚福利的影響：

1. 聲音及人類活動對於溝通及福利的影響。

例如：鯨魚會因為船隻發出的噪音改變行為。(Nowacek et al 2007)

2. 調查工作、組織取樣、標記程序...等的影響。

例如：Tezanos Pinto及Baker(2011)指出，牠們對於小型拋擲式組織切片刀（projectile biopsy lance）的反應較小，但相對的傷口癒合較慢。

Scientific assessment of effects on whale welfare:

3. Disturbance and chasing by boats: fear, exhaustion, social disruption, immunosuppression/disease.

In studies of welfare during transport and in pre-slaughter handling, this is one of the key issues. There is almost no evidence in relation to whaling. Whales are known to change behaviour in response to boat noise (Nowacek et al 2007).

4. Harpoon entry into tissues: (a) point + or – barb (tissue damage/pain and duration for each)
(b) explosive

(a) Some evidence, e.g. Oen et al 1995.

(b) A grenade harpoon has to strike in a small area in order that the animal will be immobilised (Knowles and Butterworth 2006, Ishikawa and Shigemune 2008)

The delay before unconsciousness can be estimated. The magnitude of poor welfare will be very high if there is extensive injury and a duration of many minutes or hours.

科學評估對於鯨魚福利的影響：

3. 遭船隻追逐及干擾：懼怕、疲憊、社群孤立、免疫力降低/疾病。

根據運輸及宰殺前動物福利的研究，這是其中一個關鍵問題。但關於捕鯨，目前幾乎沒有任何線索。鯨魚會因為船隻發出的噪音改變行為（Nowacek等，2007）。

4. 魚叉進入身體組織：(a) 點狀+或倒鉤（組織受損/疼痛，以及兩者連續的時間）
(b) 爆炸傷口

(a) 有一些證據，如：Oen 等人1995

(b) 魚叉手榴彈須擊中小範圍地區才可使動物麻痺。(Knowles and Butterworth 2006, Ishikawa and Shigemune 2008)

多久才失去意識是可以估計的。如果大範圍的受傷並持續幾分鐘或幾小時，將造成動物福利很大的影響。

5. Pull on line attached to harpoon: fear when can't control movements
extra pain when pulled
duration, perceived probability of capture.

The duration of the period when the line is being pulled can be measured.

The pain and fear will be considerable but are not known.

The cognitive ability of whales is certainly sufficient for: (a) awareness of increasing proximity to the ship and (b) awareness of greater risk of capture when close to the ship.

6. Procedures at capture: severity/intensity of adverse effect and delay before unconsciousness.

There is much information about the effects of procedures at slaughter in farmed animals.

There is some information about such effects in animals trapped and shot on land.

Very little is known about the effects of capture on whales.

5. 連接拉線的魚叉：當無法控制動作時，將造成恐懼
拉線時將造成額外的疼痛
期間會感受到將被捕捉的可能性

線被拉扯的持續時間是可以衡量的

疼痛及恐懼怕可能很巨大，但目前尚無法確知。

但鯨魚的認知能力足夠知道：(a)知道和船隻越來越接近及(b)知道靠近船隻極有可能被捕抓。

6. 捕捉程序：有害影響的嚴重性／強度及無意識前的延遲。

關於屠宰程序的影響，已有大量農場動物相關的資訊。

在陸上因陷阱遭捕抓及槍殺之動物的影響也有一些資料。

我們對鯨魚捕捉的影響所知甚少。

7. It is difficult to tell that the whale is (i) unconscious, (ii) dead?

Butterworth et al (2004) and Butterworth (2005) review the possibilities for evaluating insensibility and death in cetaceans.

8. Severity of effect and recovery time if wounded by harpoon but escapes. Giménez et al (2011) showed that healing of small wounds took 3-140 days.



7.要判別鯨魚是(i)無意識(ii)死亡是否很困難？

Butterworth et al(2004)及Butterworth(2005)重新探討評估鯨豚類麻痺及死亡的可能性。

8.若遭魚叉射殺但逃脫後的復原及嚴重程度。

Giménez 等人(2011)指出小傷口的復原需要3-140天不等。



Is there a humane, acceptable method of catching whales?

At present, no.

Is it likely that a method will be available soon?

No.

Hence whaling is not sustainable.

Only work aimed at benefits to whales is likely to be accepted.

Substantial adverse effects on animal welfare anywhere in the world are not tolerated by the public.

It is likely that companies and countries that allow activities that are unsustainable in that they are unacceptable to the public will have their products boycotted by increasing numbers of consumers.

Boycotts of Japanese, Norwegian and Icelandic goods are likely.

目前有任何捕鯨方式是人道的嗎？

就現況來看，沒有。

那近期內可能會有嗎？

沒有。

所以捕鯨不應該繼續。

只有對鯨魚有利的工作能被接受。

在世界任何一個地方，任何人都無法容忍低劣的動物福利。大眾無法接受公司或國家對於動物的不良對待，並有越來越多的消費者會抵制他們的產品。

聯合抵制日本、挪威及冰島的貨品。

Bateson, P. and Bradshaw, E.L. 1997. Physiological effects of hunting red deer (*Cervus elaphus*) *Proceedings of the Royal Society B*, 264, 1-8.

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**Calf welfare
especially pain control
during castration and disbudding**



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**犢牛福利
去勢與去角的疼痛管理**



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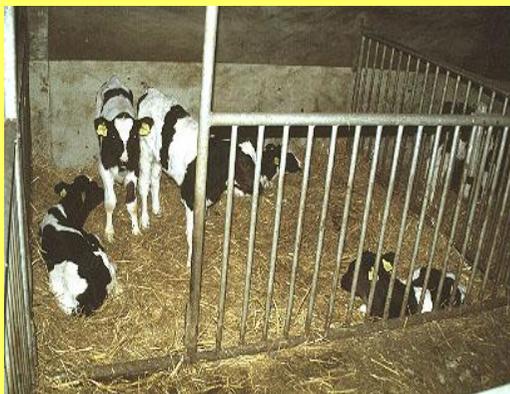
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Calf welfare may be poor because of the housing system or because of inadequate management, feeding or disease treatment.



犢牛的福利可能因為欄舍系統、不恰當的管理、餵飼或疾病治療而下降



Calves need to:

Find and suck a teat,

Ingest sufficient nutrients, including iron, and roughage,

Adopt a rest posture, rest and sleep,

Explore, show escape responses,

Exercise,

Groom whole body,

Interact socially.

犢牛需要：

找到、吸吮乳頭

攝取足夠的營養成分，包括鐵質和粗料

舒服的姿勢得以休息與睡眠

探索、表現脫逃的反應

運動

舔舐全身

社群互動

In the E.U., laws relating to dairy and beef cattle include a general Directive, based on the Council of Europe Convention on the Protection of Animals Kept for Farming Purposes, and Directives on transport and slaughter.

E.U. Scientific Committees have produced reports on the welfare of calves and beef cattle and on a wide range of cattle diseases.

The current scientific committee is the European Food Safety Authority (EFSA) Scientific Panel on Animal Health and Welfare.

The recent EFSA report on the **welfare of calves** has confirmed the conclusion of earlier reports and the current Directive that the welfare of calves is poor in small pens where they are kept individually. Calves should be kept in groups and can be managed in groups so that respiratory and gastro-intestinal disease incidence is low.

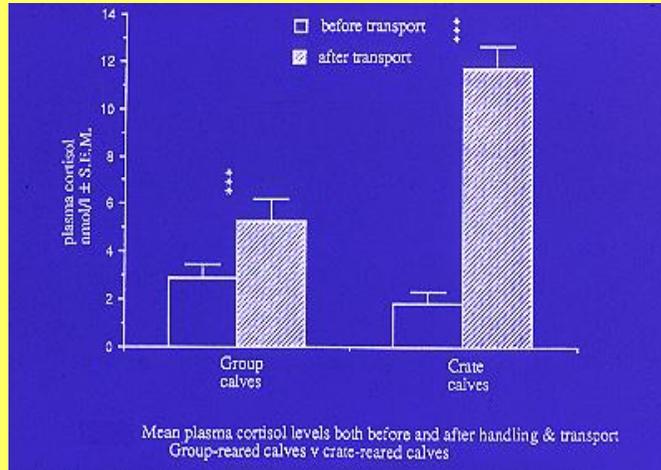
歐盟與乳牛及肉牛相關的法律，包括一般指令、運輸和屠宰指令都是依據歐洲理事會，農場動物的動物保護公約。

歐盟科學委員會發表多篇與犢牛和肉牛福利相關的報告，以及廣泛的牛病報告。

目前的科學委員會是歐洲食品安全管理局（EFSA）動物健康暨福利科學小組。

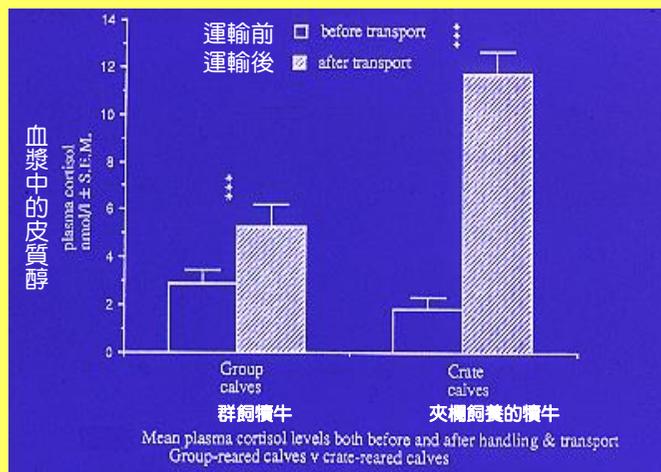
最新的犢牛福利報告，確認先前報告的以及現行的指令，證實單獨飼養在窄小欄舍的犢牛的福利不佳，犢牛必須群體飼養，而且在群體飼養管理下，呼吸道及消化道的疾病發生率較低。

Calves reared in individual pens more stressed by transport.



Trunkfield et al 1991

飼養在各別欄舍的犢牛，在運送過程中出現較多緊迫



運輸前後血漿皮質醇濃度平均值

Trunkfield et al 1991

We worked 30 years ago on factors affecting the likelihood of calves receiving sufficient colostrum.

In a recent study in Cambridge by Dr Murray Corke, colostrum supplements which vary widely in IgG levels, were found not to provide sufficient Ig for calves so should not be used as a replacement for colostrum.

Whilst IgG in colostrum is typically around 75g l^{-1}
IgG in several supplements was less than 30g l^{-1}

As the amount given is usually less than a litre, this is not enough.

我們30年前研究犢牛攝食足夠初乳的可能影響因素。

劍橋大學Murray Croke博士最近的研究指出，初乳代用品所含的「免疫球蛋白」（IgG）的濃度高低差異很大，無法提供犢牛足夠的免疫球蛋白，故不應該用來取代初乳。

初乳通常每公升含有75g的「免疫球蛋白」（IgG）

而代奶每公升中只有30g

通常餵飼量都少於一公升，並不足夠。

Research on experience of human interactions

Effects of handling Aubrac calves - Boivin and Le Neindre

Measure	No handling	Weaning	Weaning + 6mo
Eat concentrate from hand	0	100	33 %
Allow human touch	0	78	22 %
Time to sort animals	20.3	14.7	14.5 s
Animals kept still by man	0	100	89 %
Animals aggressive	57	0	0 %

與人類互動經驗的研究

與人類接觸的影響

測量項目	無接觸	斷奶	斷奶後6個月
手餵精料	0	100	33 %
允許人類觸摸	0	78	22 %
融入其他動物的時間	20.3	14.7	14.5 s
被人類保定	0	100	89 %
侵略性	57	0	0 %

Calf welfare can also be affected by treatment and conditions during transport and slaughter.



George Stilwell (University of Lisbon, large animal clinician in Vet School) and I have recently carried out studies of welfare in calves during farm operations.

運輸及屠宰的狀況條件與對待方式，也會影響犢牛的福利



里斯本大學獸醫學院大動物臨床獸醫師George Stilwell和我最近完成農場作業中犢牛福利的研究。

An initial question is do cattle feel pain?

Pain - a sensation and a feeling which are aversive and which indicate actual or potential tissue damage.

How can we know? What can we measure?

1. CAPACITY

Have they got nociceptors, pathways, analysis potential?

2. IMMEDIATE RESPONSES

□ Avoidance responses. Vocalisations and other behaviours.

Physiological responses such as increases in cortisol in plasma.

3. LATER RESPONSES

Changes in plasma acute phase proteins, immunosuppression.

Longer term behaviour changes.

4. SUPPRESSION OF RESPONSES

Are responses altered by anaesthetic usage?

Are responses altered by analgesic usage?

最根本的問題，牛會覺得痛嗎？

疼痛 一種厭惡的感知或感覺 和
身體組織實際受傷或可能受傷的指標

我們如何得知？如何測量？

1. 能力

他們有感受器、傳導途徑、分析的能力嗎？

2. 立即反應

迴避反應，發聲和其他行為。 增加血漿皮質醇等生理反應

3. 後續反應

血漿急性期蛋白的變化，免疫抑制，長期行為的改變

4. 反應的抑制

使用麻醉劑後反應會改變嗎？

使用鎮痛劑後反應會改變嗎？

Is there any evidence that cattle are just thick-skinned and don't feel pain?

Skin thickness is greater than ours.

Some touches could be appreciated less than in humans.

However, mosquito bites (penetrative) elicit responses, as do light touches.

Sub-cutaneous stimulation seems to lead to responses very readily.

What are the effects of the normal farm operations disbudding and castration on pain and fear?

Is there variation in responses to the different methods used, or in extent of pain and fear?

Can pain be relieved? Should it?

是否有任何證據證明牛皮很厚所以牛不會感覺痛？

牛皮的確比人皮厚

對某些碰觸可能反應不如人類劇烈

但蚊子咬（侵入性），以及輕微的觸摸就能引發反應

皮下的刺激反應非常靈敏

農場一般的「去角」及「去勢」作業，對疼痛與恐懼有何影響？

使用不同的方法，在痛苦和恐懼的程度上會有變化嗎？

痛苦可以緩解嗎？有必要嗎？

We decided to measure:

2. IMMEDIATE RESPONSES

Avoidance responses.

Vocalisations and other behaviours.

Cortisol in plasma.

3. LATER RESPONSES

Some longer term behaviour changes.

Later plasma cortisol.

4. SUPPRESSION OF RESPONSES

How responses are altered by anaesthetic usage.

How responses are altered by analgesic usage.

我們決定測量：

2. 立即反應

迴避反應

發聲及其他行為

血漿皮質醇

3. 後續反應

一些長期的行為改變

血漿皮質醇的變化

4. 反應的抑制

使用麻醉劑後的反應如何變化

使用鎮痛劑後的反應如何變化

The **disbudding** of calves.

the use of a surgical scoop,

a hot iron,

or caustic paste.

The **castration** methods: calves

surgical removal of the testicles,

application of a constricting elastic band (rubber ring) at the base of the scrotum,

external clamping with an appropriate device (Burdizzo method).

犢牛的去角

使用外科鏟,

烙鐵

或燒鹼

犢牛的去勢方法

外科手術移除睪丸

在陰囊基部使用緊縮的彈性帶（橡膠環）

以適當的工具鉗住陰囊外部（Burdizzo法）

Pain-related behaviours:

head-shaking,
ear-flicking,
head-rubbing,
inert lying,
alterations in gait,
amount of walking,
licking scrotum,
lifting hind leg,
abnormal lying,
rapid transitions between behaviours and
reluctance to go to the food trough .

How important is fear?

To humans?

To calves?

Some of our measurements indicate pain and fear.

與疼痛相關的行為：

搖頭
扇耳
摩擦頭部
了無生氣的躺臥
步伐怪異
行走量
舔陰囊
抬起後腿
不正常的臥姿
在某些行為間頻繁的變換
不願走到飼料槽

恐懼有多重要？

對人類？

對犢牛？

有些測量方法可以反映疼痛與恐懼。

The **disbudding** of calves by the use of **all three methods** leads to increases in:

- the concentration of plasma cortisol and
- such pain-related behaviours as head-shaking, ear-flicking, head - rubbing, inert lying and rapid transitions between behaviours.

(Stilwell, Carvalho, Lima and Broom 2008)

When 4-week-old calves were disbudded with **caustic paste**, plasma cortisol concentration increased for 60-90 minutes and pain-related behaviours increased substantially for 3-4 hours. Some changed responses reported up to 24h.

If an anaesthetic (lidocaine) was used (cornual nerve injection), the pain indicators were reduced during the first hour but not during the next two or more hours.

If the analgesic flunixin meglumine (NSAID known to inhibit mainly COX-1) was also given (i.v.), neither physiological nor behavioural indicators of pain were shown on the first day.

The use of the analgesic alone did not prevent pain indicators in the first three hours after disbudding.

(Stilwell, Carvalho, Lima and Broom 2009)

三種犢牛去角的方法都會增加：

- 血漿皮質醇濃度以及
- 某些與疼痛相關的行為，如搖頭、扇耳、摩擦頭部、無生氣的躺臥、以及頻繁變化行為 (Stilwell, Carvalho, Lima and Broom 2008)

當四周齡的犢牛以燒鹼去角，血漿皮質醇濃度升高60-90分鐘，與疼痛相關的行為持續出現3-4小時，有些行為改變甚至持續24小時。

採角神經注射麻醉劑 (lidocaine) 後，第一小時的疼痛的指標減少，但第二小時及以後的時間則無差異。

若同時以靜脈注射鎮痛劑 (flunixin meglumine, NSAID, 主要抑制COX-1) 與疼痛相關的生理及行為均不會出現。

如果單獨使用鎮痛劑，在去角後的前三小時無法預防疼痛指標出現。

(Stilwell, Carvalho, Lima and Broom 2009)

The **disbudding** of 11-week-old calves by the use of a **hot iron** also led to increases in the concentration of plasma cortisol and pain-related behaviours such as head-shaking, ear-flicking, head-rubbing, inert lying and rapid transitions between behaviours.

	Means	
	Cortisol nmol.l ⁻¹	Pain-related behaviours per period
Baseline	16	0
30 minutes after disbudding alone	122	4.9
30 minutes after disbudding + carprofen analgesic	92	2.9
30 minutes after disbudding + lidocaine + carprofen	13	0.9
1.5h after disbudding with lidocaine anaesthetic	31	1.8
6h after disbudding with lidocaine anaesthetic	34	2.8
6h after disbudding, lidocaine and carprofen analgesic	17	1.8
24h after disbudding alone	25	0.4

(Stilwell, Lima, Carvalho and Broom 2010 and in press)

使用**烙鐵**為11週齡的犢牛**去角**，會使血漿皮質醇濃度以及疼痛相關行為，如搖頭、扇耳、摩擦頭部、無生氣的躺臥，頻繁變化行為等增加。

	平均	
	皮質醇	疼痛相關行為
基準線	16	0
不使用藥物去角後30分鐘	122	4.9
使用carprofen，去角後30分鐘	92	2.9
使用lidocaine和carprofen，去角後30分鐘	13	0.9
使用lidocaine，去角後1.5小時	31	1.8
使用lidocaine，去角後6小時	34	2.8
使用lidocaine和carprofen去角後6小時	17	1.8
不使用藥物去角後24小時	25	0.4

(Stilwell, Lima, Carvalho and Broom 2010 and in press)

Plasma cortisol concentrations in calves in relation to disbudding

	Before	1 hour	3 hours	6 hours	24 hours
Scoop	7.2	27.6	26.6	14.0	11.0
Hot-iron	8.7	13.0	9.9	8.3	11.1
Caustic paste	6.1	22.7	8.3	6.0	4.6
Not disbudded	4.8	4.1	3.1	4.7	2.1

犢牛去角的血漿皮質醇濃度

	去角前	1小時	3小時	6小時	24小時
外科鑷	7.2	27.6	26.6	14.0	11.0
烙鐵	8.7	13.0	9.9	8.3	11.1
燒鹼	6.1	22.7	8.3	6.0	4.6
無去角	4.8	4.1	3.1	4.7	2.1

Behavioural indicators of pain in calves in relation to disbudding

	5 minutes	1 hour	3 hours	6 hours	24 hours	Total
Scoop	22	28	9	18	9	86
Hot-iron	38	25	10	12	2	87
Caustic paste	51	20	12	0	0	83
Not disbudded	6	0	2	2	0	10

犢牛去角與疼痛相關行為

	5分鐘	1小時	3小時	6小時	24小時	總和
外科鑿	22	28	9	18	9	86
烙鐵	38	25	10	12	2	87
燒鹼	51	20	12	0	0	83
無去角	6	0	2	2	0	10

The **castration** methods employed for calves are all known to cause severe inflammation and pain.

The use of a **Burdizzo clamp** for castrating calves led to changes in: plasma cortisol concentration and behaviour (immediate reactions to clamping, alterations in gait and amount of walking and reluctance to go to the food trough) for at least 48 hours.

Physiological responses

Plasma cortisol concentration

所有犢牛去勢的方法都會引起嚴重的發炎反應與疼痛

使用Burdizzo鉗為犢牛去勢，會引發血漿皮質醇濃度的變化，及對鉗夾的立即反應、行走姿勢的改變、行走的量以及厭惡走到飼料槽等行為會持續48小時。

生理的改變

血漿皮質醇濃度

Group	N°	castration -5 minutes	castration + 6 h	castration + 24 h	castration + 48 h
C	8	15.45±3.20 ^A	36.78±5.24 ^{aAB}	46.99±7.15 ^B	24.89±4.97 ^{bcAB}
E	8	16.22±3.45 ^A	21.56±5.90 ^{aAB}	36.46±7.15 ^B	36.28±4.07 ^{abAB}
EC	11	10.61±2.73 ^A	15.12±4.47 ^{bAB}	24.66±6.07 ^B	15.81±4.25 ^{cAB}
EF	12	19.48±2.62 ^A	17.69±4.28 ^{bA}	32.57±5.82 ^B	32.45±4.06 ^{abB}

Mean ± SE plasma cortisol concentrations (nmol/L) for castrated calves:
untreated (C),
epidural lidocaine (E),
epidural lidocaine and carprofen (EC)
epidural lidocaine and flunixin-meglumine (EF).

same lower case letters indicate no difference between groups p<0.05.
same uppercase letters indicate no difference across time p<0.05.

Group	N°	castration -5 minutes	castration + 6 h	castration + 24 h	castration + 48 h
C	8	15.45±3.20 ^A	36.78±5.24 ^{aAB}	46.99±7.15 ^B	24.89±4.97 ^{bcAB}
E	8	16.22±3.45 ^A	21.56±5.90 ^{aAB}	36.46±7.15 ^B	36.28±4.07 ^{abAB}
EC	11	10.61±2.73 ^A	15.12±4.47 ^{bAB}	24.66±6.07 ^B	15.81±4.25 ^{cAB}
EF	12	19.48±2.62 ^A	17.69±4.28 ^{bA}	32.57±5.82 ^B	32.45±4.06 ^{abB}

平均±標準差 閹割小牛血漿皮質醇濃度 (nmol / L) :

對照組 (C)
硬膜外注射利多卡因 (E)
硬膜外注射利多卡因和卡洛芬 (EC)
硬膜外注射利多卡因和氟尼辛葡甲胺 (EF)。

相同小寫字母表示沒有組間差異P<0.05。
相同大寫字母表示沒有時間的差異P<0.05

The **castration** methods employed for calves are all known to cause severe inflammation and pain.

The use of a **Burdizzo clamp** for castrating calves led to changes in: plasma cortisol concentration and behaviour (immediate reactions to clamping, alterations in gait and amount of walking and reluctance to go to the food trough) for at least 48 hours.

Behaviour:

Reluctance to go to the food trough

Responses to clamping and its effects.

Cluster analysis carried out.

所有犢牛**去勢**的方法都會引起嚴重的**發炎反應與疼痛**

使用**Burdizzo鉗**為犢牛去勢，會引發**血漿中皮質醇濃度的變化**對鉗夾的**立即反應**、**行走姿勢的改變**、**行走的量**以及**厭惡走到飼料槽**等行為會持續48小時

行為：

厭惡走到飼料槽

對鉗夾的反應及影響

進行集群分析

The **castration** methods employed for calves are all known to cause severe inflammation and pain.

The use of a **Burdizzo clamp** for castrating calves led to changes in: plasma cortisol concentration and behaviour (immediate reactions to clamping, alterations in gait and amount of walking and reluctance to go to the food trough) for at least 48 hours.

Epidural anaesthesia using lidocaine had effects for the first six hours but pain measures were unaffected during the next two days.

If the analgesic flunixin meglumine was also given, indicators of pain were not shown during the first 24 hours but were shown after that.

Treatment with the analgesic carprofen prevented pain indicators for 48 hours (carprofen is an NSAID that inhibits COX-2, half life <70h).

(Stilwell, Lima and Broom in press)

所有犢牛**去勢**的方法都會引起嚴重的**發炎反應**與**疼痛**

使用**Burdizzo鉗**為犢牛去勢，會引發血漿中皮質醇濃度的變化對鉗夾的立即反應、行走姿勢的改變、行走的量以及厭惡走到飼料槽等行為會持續48小時。

對最初6小時的疼痛有影響，但對接下來的兩天則無效果。

使用鎮痛劑則在24小時內不會出現疼痛指標，但之後就會出現。

若投予carprofen鎮痛劑可預防疼痛指標達48小時，carprofen半衰期小於70小時。

(Stilwell, Lima and Broom in press)

In a recent study, one group of cows was treated with carprofen at parturition and another group was not.

The analgesia group:

fed more often in the three days after parturition

produced more milk by 305 days in milk

were less likely to be pregnant at 220 days post-partum.

Shubert, Broom and Stilwell in prep.

最近的研究中，一組牛在分娩時施予carprofen，另一組為空白對照

鎮痛劑組：

分娩後3天餵飼較頻繁

305天的產奶期內，泌乳量較多

在分娩後220天，似較難受孕

Shubert, Broom and Stilwell in prep.

Summary

The major welfare problems for **calves** occur if the housing conditions and food are inadequate, in particular individual housing, insufficient fibre in the diet and insufficient iron in the diet.

If the conditions and feeding are good, respiratory and gastro-intestinal diseases are the important causes of poor welfare.

Farm operations are also important, anaesthesia and analgesia are needed.

In a comparison of the welfare of calves following disbudding, **all** caused pain. The effects of scoop use continued for at least 6 hours whereas the major effects of hot iron and caustic paste were in the first three hours. Some effects continued for 24 hours.

Following disbudding, there is clear evidence of pain unless both anaesthetic and analgesic are used.

總結

犛牛福利問題主要發生在不適當的欄舍條件與飼料，特別是單獨欄飼、缺乏纖維和鐵質的食物。

如果條件與餵飼均佳，則呼吸道和消化道疾病成為造成福利差的主因。

農場的手術作業也很重要，麻醉劑和鎮痛劑是必須的。

比較犛牛去角的福利，所有方法都會造成疼痛，外科鑷造成最少6小時的疼痛，烙鐵和燒鹼造成前三小時的劇痛，疼痛會持續24小時。

去角後的疼痛證據是非常明顯，除非投予麻醉劑和鎮痛劑。

Summary

Castration using a Burdizzo clamp leads to pain responses for up to 48 hours.

Work by other people shows that use of a rubber ring and surgical castration also lead to prolonged pain responses unless pain relief is given.

Calves given just lidocaine anaesthetic or just analgesic still show pain responses

Carprofen prevents later pain responses up to 48 hours.

Both anaesthetic and analgesic are needed to prevent pain in calves that are disbudded or castrated.

Such use will increase farmers' costs.

總結

用Burdizzo鉗去勢會造成48小時的疼痛反應。

其他研究顯示橡膠環、外科手術等去勢法一樣造成長期疼痛，除非使用止痛劑。

單獨投予 lidocaine 麻醉劑，或只給鎮痛劑，犢牛仍然會出現疼痛反應。

Carprofen 可以預防後期疼痛反應達48小時。

犢牛去角或去勢都必須同時投與麻醉劑和鎮痛劑。

這些藥劑的使用會增加農民的成本。

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The Welfare of Animals during Transport

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運輸期間的動物福利

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What can we measure?



我們可以評估什麼？

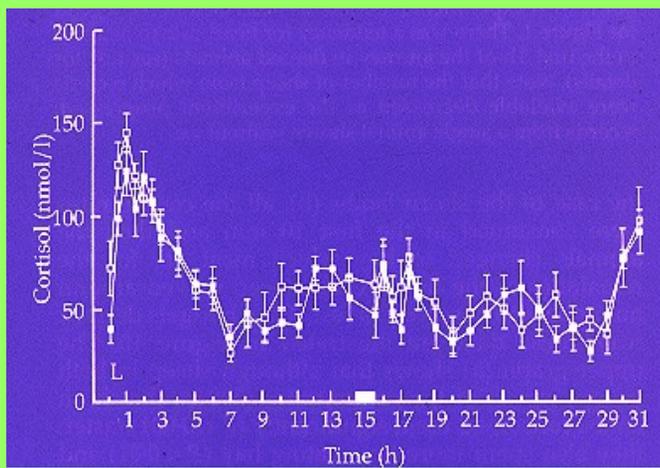




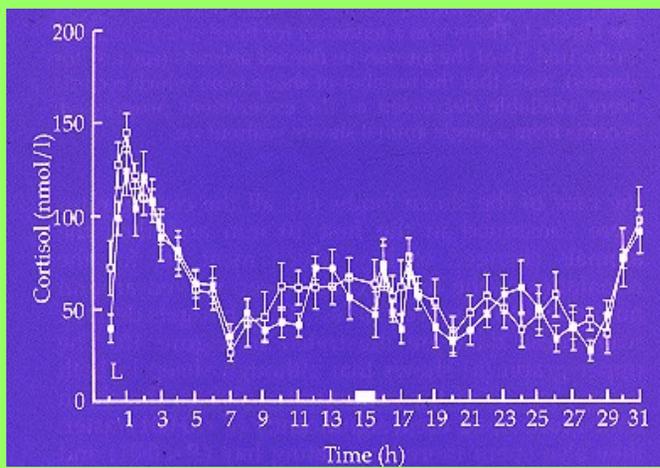




Plasma cortisol in two groups of sheep during a long journey.



兩組羊在長程運輸中的血漿皮質醇





Poor welfare during transport is often associated with poor carcass quality and reduced value.

Bruising, bone breakage, PSE and DFD meat cost money.

Also, animals are very obvious during transport.

Public concern about poor welfare during handling and transport results in some consumers refusing to eat meat at all and many refusing to buy from a particular country or company.

運輸期間動物福利的低落，通常會影響到肉品質量，並使價值受損。

淤血，骨頭斷裂，水漾肉（PSE）與暗乾肉（DFD）會影響肉品價格。

而且在運輸期間的動物是非常顯而易見的。

社會大眾對運輸及裝卸時動物福利低落情況的關注，會導致消費者完全拒絕食用肉品，也有很多消費者拒絕向特定一些國家或公司購買肉品。

Transport. The procedures associated with the carrying of animals from one location to another by road, rail, ship or air.

Journey. An animal transport journey should be regarded as commencing when the first animal is loaded onto a vehicle and as ending when the last animal is unloaded, and includes any stationary resting / holding periods.

The same animals should not be regarded as commencing a new journey until a period of over 48 hours sufficient for rest and recuperation of the animals with adequate food and water provided, has passed since the end of the previous journey.

運輸：運輸流程是以道路，鐵路，海運或空運方式將動物自一處運載至另一處。

路程：動物的運輸路程自第一隻動物裝載到運輸工具上開始，於最後一隻動物被卸載後結束，並包含所有的休息及等候期間。

同一隻動物在展開新的運輸前，應有超過48小時的休息與恢復，並且在休息期間需供應充足的食物與飲水。

Factors which can result in poor welfare during animal handling and transport.

1. Attitudes to animals.
2. Lack of knowledge about animals and their welfare.

運輸及裝卸期間會導致動物福利低落的原因

1. 對待動物的態度
2. 對動物及其福利知識的缺乏

Attitudes to animals

If people regard animals as non-sentient automata, they may treat them badly.

Greater knowledge usually means less cruel behaviour and better welfare.

Better education is the key.

All staff should be trained about biological functioning and welfare.

對待動物的態度

如果人們將動物視為沒有情識的「器物」，就可能會錯待動物。

更多的知識通常可減少殘忍的行為並增進福利。

加強教育是關鍵。

所有工作人員皆應接受關於生物功能及福利之訓練。



Factors which can result in poor welfare during animal handling and transport.

1. Attitudes to animals.
2. Lack of knowledge about animals and their welfare.
3. Laws.
4. Retailer codes of practice

運輸及裝卸期間會導致動物福利低落的原因

1. 對待動物的態度
2. 動物及其福利知識的缺乏
3. 法律
4. 零售商的工作守則

Who has responsibility for transported animals?

Owners

Buying or selling agents

Animal handlers

Transport companies and vehicle owners

Drivers

Managers and staff of facilities at start and end of journey

誰應該在動物運輸期間負起責任？

飼主

買賣的仲介商

裝卸工作人員

運輸公司及運輸工具持有人

司機

運輸路程自開始到結束間，相關設施的經理與工作人員

Who should receive training?

All those who will handle animals, e.g. during loading or unloading.

All those who drive livestock vehicles.

Others with direct responsibility for the animals.

誰應該接受訓練？

所有負責搬運處理動物的人，例如：在裝載及卸載期間

所有活體牲畜運輸工具的駕駛

其他對動物有直接責任的人

What should be taught during training?

Practicable methods for assessing welfare, including health.

Some laws and codes of practice.

Methods of handling animals, driving vehicles containing animals and inspecting animals.

How to deal with emergencies.

訓練的內容為何？

評估福利，包括健康的實用方式

相關法律以及工作守則

裝卸動物，駕駛載有動物的交通工具以及檢查動物的方式

危機處理

How should vehicles be designed and maintained for animal transport?

Taking account of effects on animal welfare, for example:

how to ventilate adequately,

possibilities for injury or disease transmission

and how to inspect the animals.

The same points apply to animal containers, e.g for poultry.

動物運輸的交通工具應如何設計及維護？

將動物福利列入考慮，例如：

如何保持良好的通風

避免疾病傳染或受傷的可能性

如何檢查動物

相同的考量亦可應用在裝動物的箱籠，例如家禽的籠子

What documentation is needed before and during transport?

How should the journey be planned?

Travel plans should refer to:

- the time and expected place for stops,
- how any mixing of animals will be minimised,
- space allowance to be used,
- how food and water will be provided if they are necessary,
- emergency plans, e.g. for disease or bad weather.

運輸前和期間，需要準備哪些文件？

應如何規劃路程？

路程規劃應該考慮：

- 時間以及中途休息的地點
- 如何減少不同種類動物的混合裝載
- 空間的彈性使用
- 在需要的時候，如何供應食物及飲水
- 危機處理計劃，例如：疾病或是惡劣的天氣

Factors which can result in poor welfare during animal handling and transport.

5. Breed of animal and selection for production characteristics

運輸及裝卸期間會導致動物福利低落的原因

5.動物的品種以及生產特性的選擇

Breed of animal and selection for production characteristics

Some breeds show higher heart rate and salivary cortisol response to handling/mixing than others.

Orkney sheep > Cluns (Hall et al 1998)

動物品種以及生產特性的選擇

有些品種的動物會因為裝卸搬運以及與其它動物混合而導致心跳速率較高及唾液皮質醇分泌較多。

奧克尼羊 > 克倫 Cluns (Hall et al 1998)

Breed of animal and selection for production characteristics

Beef cattle bred for fast growth may have more leg disorders.

High producing dairy cow lines have more leg and foot disorders.

Welfare during transport worse in both cases.

動物品種以及生產特性的選擇

快速成長的肉牛品種比較容易有四肢疾病。

多產的乳牛比較容易有四肢及腳蹄疾病。

這兩種動物在運輸期間的動物福利狀況都比較糟糕。

Factors which can result in poor welfare during animal handling and transport.

5. Breed of animal and selection for production characteristics

6. Experience of transported animal:
housing conditions,
human contact,
and social contact.

運輸及裝卸期間會導致動物福利低落的原因

5. 動物的品種以及生產特性的選擇

6. 動物在運輸期間的經驗：

安置條件，
與人類的接觸，
社群接觸。

Experience from housing conditions, human contact, and social contact.

Calves reared in individual pens more stressed by transport
(eg Trunkfield et al 1991).

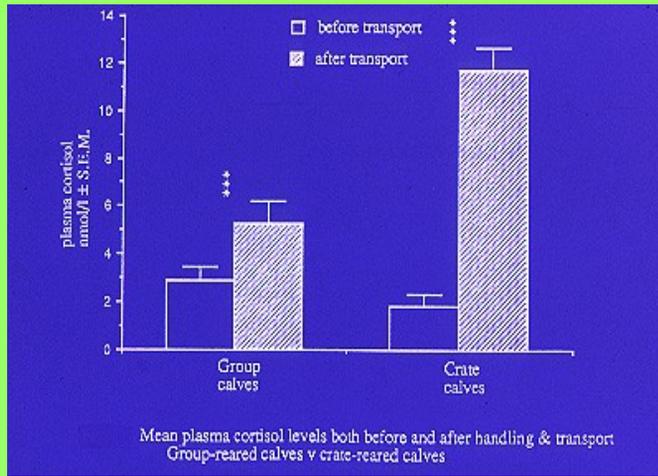
Range cattle easier to handle if calm human contact at weaning
(eg Le Neindre et al 1996).

安置條件，人類接觸以及社群接觸的經驗

飼養在單獨圍欄的小牛，較易在運過程中感到緊迫。（eg Trunkfield et al 1991）

放養的牛隻在斷奶時，如果與較為冷靜類型的人接觸，在運輸中裝卸處理會比較容易。（eg Le Neindre et al 1996）

Calves reared in individual pens more stressed by transport.



Trunkfield et al 1991

飼養在單獨圍欄的小牛，較易在運過程中感到緊迫。



Trunkfield et al 1991

Factors which can result in poor welfare during animal handling and transport.

7. Design of vehicle, loading and unloading facilities



運輸及裝卸期間會導致動物福利低落的原因

7. 運輸工具及裝卸動物的設備設計



Factors which can result in poor welfare during animal handling and transport.

8. Insufficient space allowed.

Some animals stand during all transport, e.g. horses.

Others stand on short journeys but lie after a few hours, e.g. sheep

Others lie on all journeys if possible, e.g. pigs, chickens.

Animals which stand, need space to stand with legs braced so that they can maintain balance on a moving vehicle.

They make great efforts not to touch one another.

For comfortable standing and lying, sufficient area and headroom are needed.

運輸及裝卸期間會導致動物福利低落的原因

8. 活動空間不足

有些動物在整個運輸期間都站著，例如：馬

其他動物則是在短程運輸中站著，在數小時候才能躺下休息，例如：羊

另一些動物在運輸全程中盡可能躺著，例如：豬，雞

站著的動物需要空間讓支撐身體的腳得以移動，以便在行進的運輸工具上保持平衡

他們必須努力保持與其它動物之間的距離

舒適的站立以及躺下必須有充足的區域以及頭頂空間（headroom）

Space allowance/Stocking density

Tarrant et al (1992) found during transport of Friesian steers:

	Low S D	High S D
Falls	1	8
Cortisol ng/ml	0.1	1.1
Creatinekinase	132	687
Bruise score	3.7	8.5

活動空間/牲口密集度

Tarrant 等人(1992)發現荷蘭牛（黑白花）公牛在運輸時：

	低密度	高密度
跌倒	1	8
皮質醇 (ng/ml)	0.1	1.1
肌酸激酶	132	687
淤血傷痕	3.7	8.5

Many of the key factors affecting animal welfare are determined pre-journey.

It is important to determine group-composition and put the animals in appropriate pens/containers on the vehicle.

Previous travel experience affects welfare.

Some animals are not fit to travel or are at risk.

Conditions before loading, for example adequacy of shelter, can have big effects on welfare.

很多影響動物福利的關鍵因素取決於運輸前的準備。

決定哪些動物可以放在同一群中運輸，以及將動物放在運輸工具上合適的圍欄／箱籠中。

之前的旅途經驗影響動物福利。

有些動物不適合被運輸，或是會在路程中有風險。

裝載前的情況，例如遮蔽（shelter）是否充足對動物福利有很大影響。

Factors which can result in poor welfare during animal handling and transport.

9. Tying, mixing

10. Inappropriate staff payment and insurance

11. Poor planning, e.g. concerning temperature, disease risk, or emergencies

導致動物福利低落的原因

9. 捆綁，混合

10. 不當的薪資給付以及保險

11. 缺乏規劃，例如：考量溫度，疾病風險或是危機處理

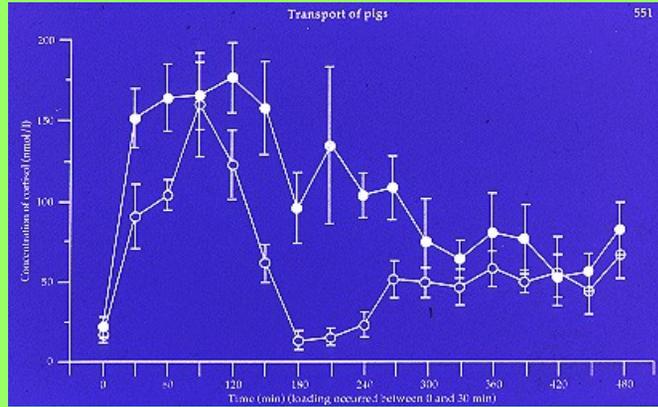
Factors which can result in poor welfare during animal handling and transport.

12. Poor handling, loading, unloading

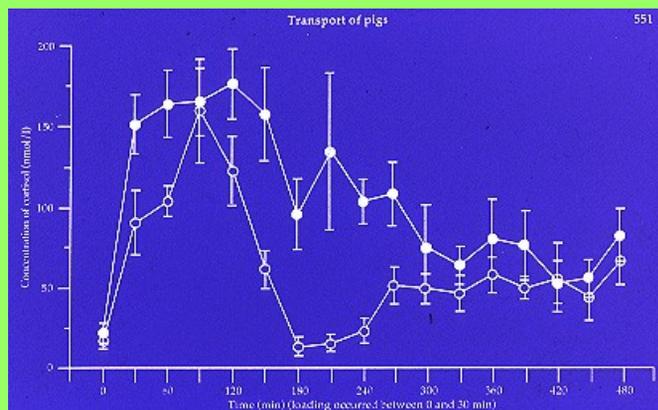
運輸及裝卸期間會導致動物福利低落的原因

12. 裝卸搬運處理不當

Effect of loading only or loading and transport on plasma cortisol in pigs



只有裝載，或運輸及裝載，對豬隻血漿皮質醇的影響



Loading of animals requires good facilities and supervision.

The use of goads or violent use of sticks etc. can cause very poor welfare.

Lifting animals by ears, tail or wool causes pain.

裝載動物需要良好的設備以及監督。

使用驅趕電擊棒或尖棍等等，可能影響動物福利。

搬抬動物時以抓動物的耳朵，尾巴或是身上毛髮的方式會導致疼痛及受傷。

Factors which can result in poor welfare during animal handling and transport.

12. Poor handling, loading, unloading

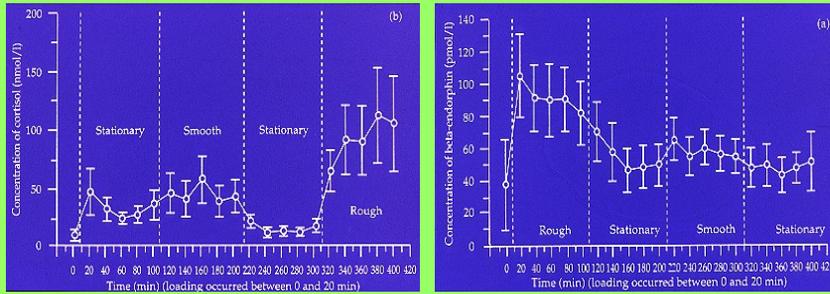
13. Poor quality driving

運輸及裝卸期間會導致動物福利低落的原因

12. 裝卸搬運處理不當

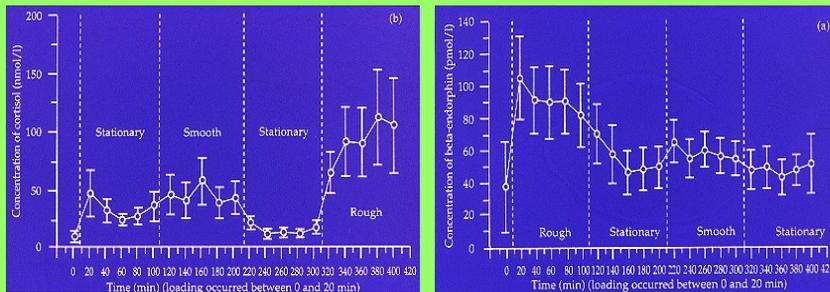
13. 駕駛不當

Poor quality driving



Cortisol in sheep while on motorway, country road, or stationary.

駕駛不當



在公路，鄉間小路或或是休息站時羊隻的皮質醇變化

Factors which can result in poor welfare during animal handling and transport.

12. Poor handling, loading, unloading

13. Poor quality driving

14. Bad physical conditions

運輸及裝卸期間會導致動物福利低落的原因

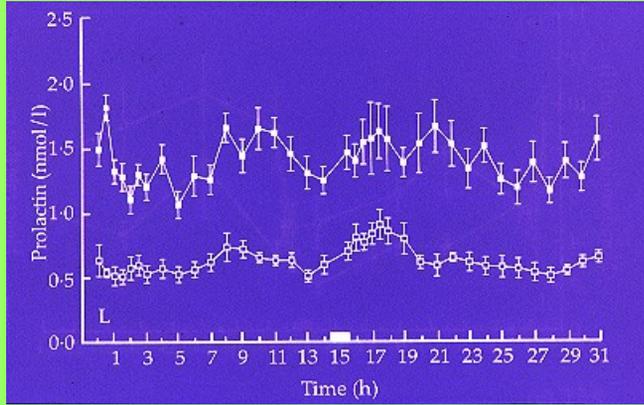
12. 裝卸搬運處理不當

13. 駕駛不當

14. 動物生理狀況不佳

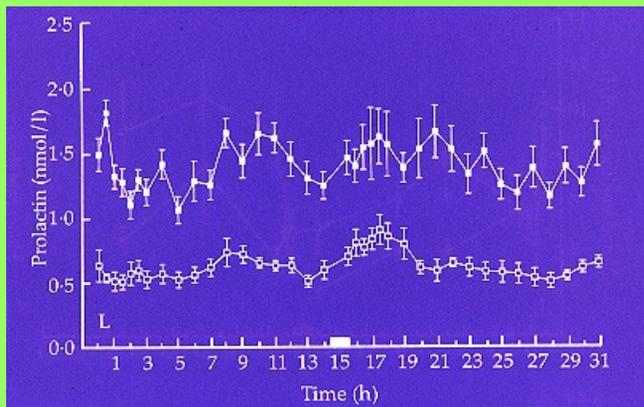
Prolactin in plasma is higher in overheated animals

Fleeced sheep v shorn sheep



動物如果過熱時，血漿中的催乳激素較高

剪毛後的羊 v 剪毛前的羊



Factors which can result in poor welfare during animal handling and transport.

12. Poor handling, loading, unloading

13. Poor quality driving

14. Bad physical conditions

15. Journey duration too long

運輸及裝卸期間會導致動物福利低落的原因

12. 裝卸搬運處理不當

13. 駕駛不當

14. 動物生理狀況不佳

15. 路程過長



Factors which can result in poor welfare during animal handling and transport.

12. Poor handling, loading, unloading

13. Poor quality driving

14. Bad physical conditions

15. Journey duration too long

16. Inadequate animal monitoring

運輸及裝卸期間會導致動物福利低落的原因

12. 裝卸搬運處理不當

13. 駕駛不當

14. 動物生理狀況不佳

15. 路程過長

16. 缺乏有效的動物監控

Some reasons why welfare may be poor after transport:

injury received during transport,

immunosuppression resulting from poor welfare during transport,

disease transmitted directly within vehicle or at lairage, or by animal products.

運輸之後動物福利低落的幾個原因：

運輸期間受傷，

因運輸期間的動物福利低落所引起的免疫系統下降，

在運輸工具或是牲口圍欄裡傳染，或是來自其它動物製品的疾病。

As trade in farm products becomes more and more international, and consumers in increasing numbers of countries demand good welfare standards during animal transport, the necessity for international standards for animal welfare during transport becomes more important.

The OIE standards are likely to be a minimum that most countries will follow.

However, the standards enforced by food retail companies in some countries will be higher.

Hence most countries will choose to use the higher standards.

農產品的貿易越來越國際化，越來越多的消費者也要求在運輸期間有好的動物福利，提高動物在運輸時的福利標準也相形重要。

世界動物衛生組織（OIE）的標準，適合多數國家採為最低準則。

某些國家的食品零售公司所施行的標準更高。

因此，多數國家會選擇更高的標準。

In the long term, education has a great effect on human attitudes.

People with more knowledge of animal welfare science, and on the physiology, behaviour, and cognitive ability of animals are more likely to treat them in a way that ensures that their welfare is good.

20 years ago there were about six people in the world teaching animal welfare in veterinary, agriculture, biology and psychology courses.

Now there are hundreds.

For example, 32 in Brazil.

People in many countries know from books and television programmes that farm and companion animals are clever.

長遠來看，教育可以顯著影響人類的態度。

較瞭解動物福利科學，生理學，行為以及動物認知能力知識的人，比較容易在對待動物的過程中確保動物的福利。

20年前，全世界大約只有6個人在獸醫，農業，生物學以及心理學的課程中，教導動物福利。

但現在已經有數百人。

例如在巴西就有32個人。

許多國家的人可以從書本或是電視節目中，得知農場動物以及同伴動物很聰明。

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Cattle Welfare



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Dairy cow welfare problems: consequences of breeding

Is inability to adapt related to genetic selection in animal breeding?

This would depend on how heritable the characters are.

Jensen et al 2008 produced a list of behavioural qualities and heritability estimates for them.

They pointed out that many of these were based on too small a sample.

Studies of the heritability of production traits in dairy cattle can have much larger sample sizes.

乳牛福利問題：繁殖的後果

是否動物的「難以適應」(inability to adapt)問題，與基因篩選育種有關？

這將取決於牛隻性狀的遺傳性如何。

□ Jensen等人於2008年，製作了一份牛隻行為品質及其可遺傳性預估表。

但他們指出，評估中有些項目之採樣規模太小。

乳牛產量特性可遺傳性的研究，應可以有較大的採樣規模。

When dairy sires are ranked for productivity, two sires may be the same but productivity of their progeny may vary from one housing environment to another (scaling effect).

For production animals, heritability is higher if there is more control.

□

For example, milk yield had a slightly higher heritability in U.S. dairy cattle in indoor systems than in extensive systems.

(Fahey et al 2007)

入選等級的兩隻公乳牛，可能等級一樣，但其後代的生產力，就可能因不同的飼養環境，而有很大不同（放大效應，scaling effect）

□ 有生產力的動物，可遺傳性通常會因較多的控制而提高。

例如，在美國，室內圈養乳牛之泌乳性狀遺傳性，比放牧系統乳牛稍微高些。

(Fahey et al 2007)

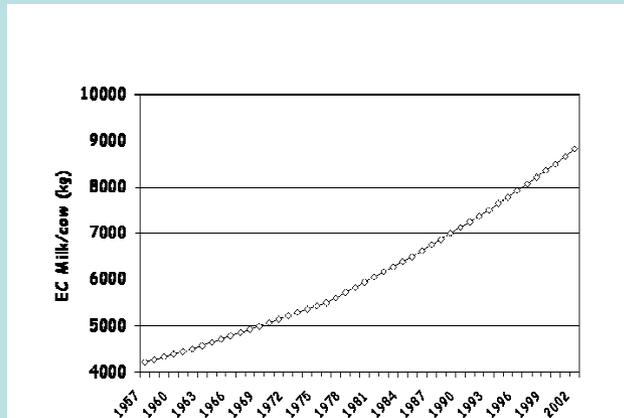
What selection methods have been used for farm animals?

1. Select from within a group, e.g. the least lame cows.
For poultry, selection based on individuals or on group performance has been tried. (Muir and Craig 1998).
- 2. Cross-breed animals so the heterosis results in more robust progeny.
- 3 (a). Use a selection index (conventional description) that allows several traits to be selected for at once.
The consequences depend on the weighting of traits.
- 3 (b). Use a selection index (genomic description).
Genetically selected estimated breeding index (GSEBI) produced.

何種篩選方法曾使用於農場動物？

1. 從同一群動物中篩選，例如：選最沒有跛腳問題的牛隻。
家禽類：按個別動物或整群動物的表現篩選，兩種方式都曾試過。(Muir and Craig 1998)
- 2. 不同動物品系雜交，可結合不同動物品系之優勢，而繁殖更強健的後代。
- 3 (a). 使用篩選指數（傳統描述）可一次選擇多種性狀。
但結果會因性狀的比重而有不同
- 3 (b). 使用篩選指數（基因體描述）
基因篩選預估繁殖指標（GSEBI）

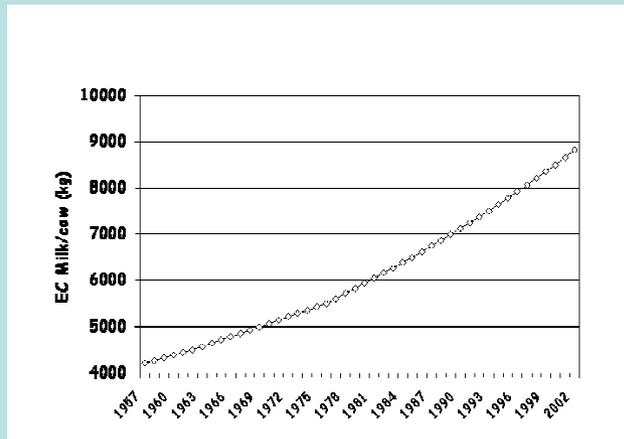
On many farms the average production per cow is over 10,000 kg of milk per lactation and individual cows may produce twice as much.



Average energy corrected milk yield for Swedish dairy cows over time: increased from 4,200 kg to 9,000 kg between 1957 and 2003.

(from Oltenacu and Algers 2005).

許多農場每頭牛平均每個哺乳期可生產一萬公斤牛乳，而單獨牛隻產量可近兩倍之多。



瑞典乳牛能量修正 (energy corrected) 後的泌乳量：在1957到2003年間，從4200公斤增加到9000公斤。

(from Oltenacu and Algers 2005).

United States

1957-2007: the average milk production per cow increased by 5997 kg., 3390 kg of this increase, or 56%, was due to genetics.

(Oltenacu 2008)

UK

1996-2002: an increase in average yields of dairy cows of about 200 kg/year, 50% of the increase in milk yield is attributed to genetics.

(U.K. national records)

Changes in dairy cows in Austria

		1988	2007
Mean yield per lactation (kg)	Holstein	5500	8200
	Simmental	4500	6600

(Knaus 2009)

美國

1957-2007：平均每頭乳牛泌乳量增加5997公斤，其中3390公斤或56%是來自於基因改變。（Oltenacu 2008）

英國

1996-2002：平均乳牛泌乳量每年增加200公斤，其中50%是來自於基因改變（U.K. national records）

澳洲乳牛的改變

		1988	2007
每哺乳期平均產量(公斤)	荷蘭牛	5500	8200
	瑞士牛	4500	6600

(Knaus 2009)

The dairy animal is producing (many 10,000 kg +) considerably more than its ancestor would have.

The beef cattle average is 1000–2000 kg (Webster 1993).

The peak daily energy output of the dairy cow per unit body weight is not very high in comparison with some other species such as seals or dogs.

However, the product of daily energy output and duration of lactation is very high indeed.

Hence long-term problems are the most likely to occur in high producing animals.

(Broom 1995, 2001, Nielsen 1998)

現今乳牛比其祖先，產出非常多倍（一萬公斤以上）的乳汁。

一般牛隻平均泌乳量為1000到2000公斤。(Webster 1993)

乳牛每身體重量單位，每日輸出最高能量質，比起其他物種如海豹或犬隻，相對不高。

不過，每頭乳牛每日輸出能量的產出及哺乳期，的確很高。

因此長期的問題，最有可能出在高產量的動物身上。

(Broom 1995, 2001, Nielsen 1998)

Why should we be concerned about milk production levels?

Because of effects on a series of indicators of poor welfare:
reproductive problems, leg disorders, udder disorders, starvation, reduced longevity.

Also other aspects of sustainability such as utilisation of resources that humans could use and wasteful production of greenhouse gases.

為何需要考慮牛乳產量水平？

因為一系列不良動物福利指標的效應：

生殖的問題，腿部疾病，乳房乳腺疾病，挨餓，壽命減短。

還有其他永續性的相關問題：例如使用人類也可使用的資源，及溫室效應氣體的污染。

Welfare indicators 1. Reproductive problems

Calving intervals in the USA were 13 months in 1960

13.5 months in 1986

but over 15 months in 2002.

Where cows were culled, the reason given for culling for 36.5% was failure to conceive.

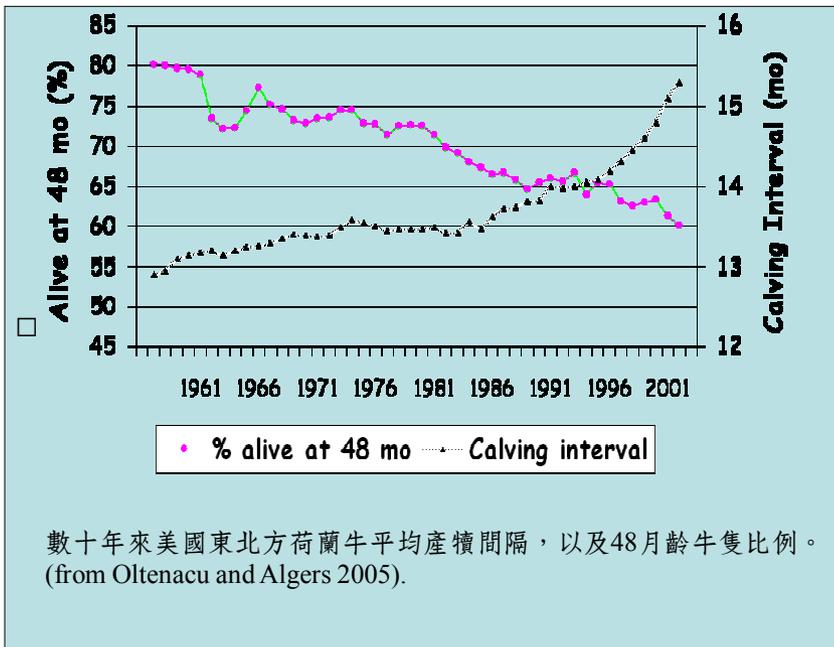
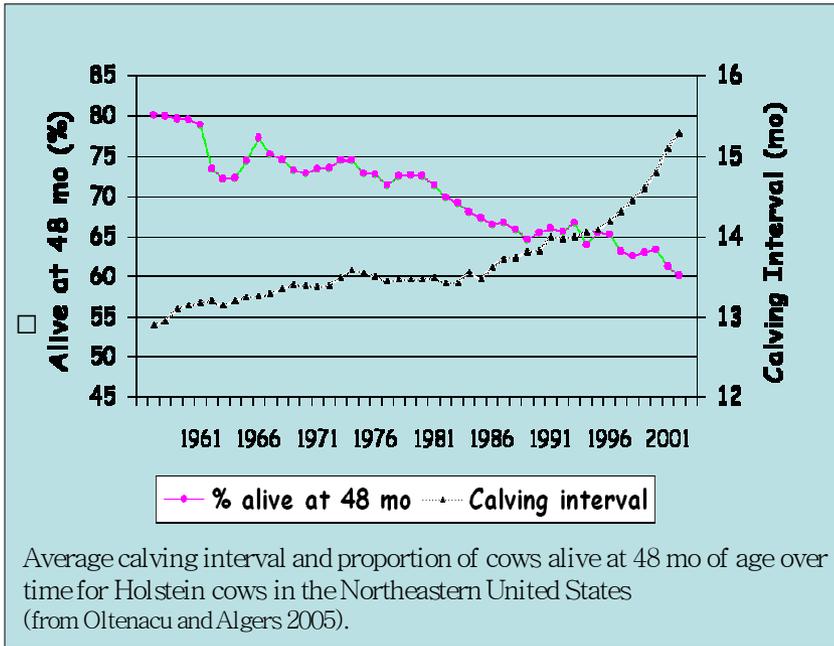
福利指標1：生殖問題

1960年代在美國，產犢間隔時間約為13個月

1986年約13.5個月

2002年則超過15個月

淘汰乳牛，高達36.5%的淘汰理由，是無法懷孕生育。



The percentage of cows pregnant after first service in USA 1951 was 65%
in 1975-1982 it was 56%
by 1995-1998 it was 40%

This percentage has been dropping recently by 1% per annum.

(Lucy 2001)

Most of this change has occurred since the time that genetic effects were substantial.

1951年在美國，在第一次配種後牛隻懷孕比例為65%
1975-1982年間為56%
1995-1998年間為40%

這比例逐年減少1%
(Lucy 2001)

這些改變大多數是源於重大基因效應。

Welfare indicators 2. Other metabolic disorders

The reproduction problems are largely a consequence of metabolic disorders but other metabolic disorders, such as ketosis, also occur in dairy cows.

Lameness and mastitis are also linked to metabolic disorders.

There is a genetic correlation between milk yield and metabolic disorders so all of these, including reproductive disorders, lameness and mastitis are production related diseases.

福利指標2：其他新陳代謝疾病

生殖問題大部分是因為新陳代謝疾病所引發的結果，但其他代謝問題，如酮酸血症（ketosis），也會發生在乳牛身上。

跛足及乳腺炎，也與代謝疾病有關。

乳汁生產及代謝疾病之間有遺傳性的關聯，以致這些疾病包含：生殖疾病，跛足，及乳腺炎等，都是與生產性狀相關的疾病。

Welfare indicators 3. Leg and foot disorders

In the U.K. in 1980, lameness in dairy cows was estimated to be less than 10%.

By 1990 it was more than 20%.

The more widespread use of cubicle houses was one of the causes of the increase.

Publications of careful studies in the last 15 years in various high-producing countries show leg and foot problems to be 35 -59 cases per 100 cows per annum.

This further increase is mainly attributable to genetic change and associated feeding and metabolism.

An example of a link to milk yield: cows that got sole ulcer and white line disease were higher than average yielders in the herd.

Amory et al 2008 Preventive Veterinary Medicine 83, 381-391.

福利指標3：腿足疾病

1980年代在英國的乳牛，有跛足疾病比例者，估計不超過10%

1990年底，估計超過20%

越來越廣泛的「小隔間」畜舍，是引起跛足比例增加的主要原因之一。

過去15年來針對不同高產量國家的仔細研究顯示，每100頭牛每年就有35-59個腿足疾病問題產生。

後來比例逐漸增加，主要是因為基因改變，及餵食與代謝相關的問題。

一個與牛乳生產相關聯的案例：高產量乳牛得到蹄部潰爛（sole ulcer）及白線疾病（white line disease）的比例，比牛群中平均泌乳量的牛為高。

Amory et al 2008 Preventive Veterinary Medicine 83, 381-391.

Welfare indicators 4. Mastitis

Mastitis has also been increasing during the last 30 years, despite improvements in veterinary treatment.

Ingvartsen et al 2003 reported that after a high-yield lactation there was more mastitis in the next lactation.

Several studies in high-producing countries report 40 cases per 100 cows per annum.

福利指標4：乳腺炎

儘管獸醫對乳腺炎的治療方法有相當的進步，但在過去30年間，乳腺炎仍逐年增加。

2003年 Ingvartsen等人研究指出，在高產量泌乳期過後，會有更多乳腺炎在下一個哺乳期發作。

數個研究顯示，在高產量國家，每100頭乳牛每年有40個乳腺炎案例。

Pryce et al 1997 reported from UK positive correlations between milk production level and indicators of poor welfare.

Milk yield from 33,732 lactation records:

calving interval	0.50	±	0.06
days to first service	0.43	±	0.08
mastitis	0.21	±	0.06
foot problems	0.29	±	0.11
milk fever	0.19	±	0.06

Pryce等於1997年，在一份英國報告指出，牛乳生產水平與不良動物福利指標間，有積極的關聯性。

33,732個哺乳期之泌乳紀錄顯示：

產犢間隔	0.50	±	0.06
第一次配種後天數	0.43	±	0.08
乳腺炎	0.21	±	0.06
腿足問題	0.29	±	0.11
牛乳熱病	0.19	±	0.06

A summary of 14 studies is that milk yield has a positive genetic correlation with:

ketosis in the range 0.26-0.42

mastitis 0.15-0.68

lameness 0.24-0.48

ovarian cyst 0.23-0.42

(Oltenucu 2008 in *Sustainable Animal Production*, ed. Åland and Madec)

總結14個研究的結果顯示，泌乳量與下列疾病的基因正相關：

在特定範圍的酮酸血症 0.26-0.42

乳腺炎 0.15-0.68

跛足 0.24-0.48

卵巢囊腫 0.23-0.42

(Oltenucu 2008 in *Sustainable Animal Production*, ed. Åland and Madec)

Welfare indicators 5. Starvation

Starvation is an energy availability deficit which results in metabolism of functional tissues rather than just food reserves.

(Broom and Fraser 2007, *Domestic Animal Behaviour and Welfare*, 4th edn, Wallingford: CABI.)

Dairy cows utilise body tissue during part of lactation and may be hungry or starving because the metabolic output is greater than their input from food.

(Webster 1993 *Understanding the Dairy Cow*)

Higher yielding cows utilise more body tissue than lower-yielding cows so are starving for longer. (Veerkamp 1998)

Combinations of metabolites are needed to show that significant starvation has occurred. (Agenäs *et al.* 2006)

福利指標5：飢餓

飢餓，與其說是食物儲存不足，應該說是一種因功能性組織的新陳代謝問題，產生的有效能量不足的現象。（Broom and Fraser 2007, *Domestic Animal Behaviour and Welfare*, 4th edn, Wallingford: CABI.）

乳牛因為在哺乳期間，消耗利用其身體組織，其新陳代謝消耗量大過於乳牛攝取的食物，而造成飢餓或挨餓的現象。（Webster 1993 *Understanding the Dairy Cow*）

產量大的乳牛比產量低的乳牛，消耗更多身體組織，故其挨餓時間更久。（Veerkamp 1998）

需將代謝物綜合，始可顯示已經發生值得注意的挨餓現象（Agenäs *et al.* 2006）

Welfare indicators 6. Reduced longevity

The number of calves produced by the average Holstein in the USA in 1966 was 3.4.

By 1994, the average was 2.8.

Dairy cows in Austria		1988	2007
Mean number of parities in culled	Holsteins	3.6	3.3
	Simmental	3.95	3.9
Mean number of calves	Holsteins	3.59	3.26
	Simmental	3.98	3.87

(data from Knaus 2009)

The increases in all six indicators of poor welfare coincide with the increase in Holstein use.

The optimal profitability in dairy production has been calculated to occur if the cows live for six lactations. (Essl 1998)

福利指標6：壽命減短

1966年美國荷蘭牛平均生產3.4頭小牛。

到1994年底平均是2.8頭。

澳洲乳牛		1988	2007
平均淘汰乳牛產褥	荷蘭牛	3.6	3.3
	瑞士牛	3.95	3.9
平均犢牛數量	荷蘭牛	3.59	3.26
	瑞士牛	3.98	3.87

(data from Knaus 2009)

六個不良福利指數的增加 與荷蘭牛使用的增加同時發生。

經過計算，乳牛壽命若達六個哺乳期，其泌乳總量可達最高利潤。(Essl 1998)

Effects of bovine somatotrophin (BST) usage on dairy cow welfare

Increase in risk of clinical mastitis above risk in non-treated cows as demonstrated using meta-analyses or large data-sets: five studies 15-45%, 23%, 25%, 42%, 79%.

Foot disorders: large scale study with multiparous cows showed 2.2 times more cows affected and 2.1 times more days affected.

Pregnancy rate dropped from 82% to 73% in multiparous cows and from 90% to 63% in primiparous cows.

Multiple births substantially increased.

Injection site: severe reactions in at least 4% of cows.

(Report of E.U. Scientific Committee on Animal Health and Animal Welfare, adopted 10th March 1999)

乳牛使用生長激素（BST）對其福利之影響

大規模分析或大量數據顯示，使用生長激素牛隻增加診斷出乳腺炎的風險，五個研究分別為：15-45%，23%，25%，42%，79%。

腿足疾病：大規模針對一胎多子牛隻的研究顯示，一胎多子牛隻比正常牛隻多2.2倍的感染，且感染天數增加2.1倍。

一胎多子母牛受孕率從82%降低至73%，而初次分娩母牛受孕率從90%降低至63%。

一胎多子化大大的增加。

注射部位：至少4%以上牛隻有激烈反應。

(Report of E.U. Scientific Committee on Animal Health and Animal Welfare, adopted 10th March 1999)

Are current trends in dairy farming leading to a sustainable industry?

Three factors may make some dairy farming unsustainable.

Cow welfare.

Efficiency of production in relation to human food requirements.

Greenhouse gas production.

現代酪農業的趨勢是否往永續發展的方向？

三個因素可能影響一些酪農牧場無法永續經營：

— 牛隻福利。

— 與人類食物需求相關聯之生產效能。

— 溫室氣體效應。

Cow welfare.

This is the most important current problem for the dairy industry.

At present, considering the severity of the effect on welfare, the duration of the effect and the number of individuals involved, after broiler chickens, dairy cow welfare is the worst animal welfare problem in Europe.

Urgent action to change genetic selection and management of dairy cows is needed.

牛隻福利

這是目前酪農產業最重要的課題

考量導致不良動物福利的嚴重程度，其持續時間，以及涉及的動物個體數量，乳牛福利是繼肉雞問題後，目前歐洲所面臨最嚴重的動物福利問題。

必須緊急採取行動，馬上改變遺傳基因篩選及乳牛的管理。

Efficiency of production in relation to human food requirements.

Dairy cattle can utilise pasture plants, a resource unavailable to humans as food. However, many are fed concentrates that humans could utilise.

If cows produce 9000 kg per lactation, 40% of their diet has to be concentrates and 96% of the protein they eat could have been used by humans. This is a serious net loss of nutrients for humans.

If dairy cows have a diet of 70% forage plants and the 30% concentrates includes 70% from by-products, there is a net food benefit for humans.

Below this, there is a net food loss which should be avoided.

與人類食物需求相關聯之生產效能

乳牛可利用牧草，是一種無法成為人類食物的資源，但是許多乳牛被餵食人類可以利用之精料。

若乳牛可於每哺乳期生產9000公斤的牛乳，其40%的食物必須是精料，且所攝取的蛋白質有96%為人類可以利用的營養。這是人類一個嚴重的營養淨值的損失。

若乳牛70%的食物來自草料植物，30%來自精料且當中70%來自副產品，則對人類食物的利用有利益淨值。

低於此百分比，則會產生應該避免的食物淨值損失。

Greenhouse gas production.

Dairy cows produce methane, a greenhouse gas.

Whilst there should be efforts to minimise this, the value of cattle as utilisers of pasture that we cannot otherwise use can be balanced against this.

If cows live for a shorter time, their greenhouse gas production per unit of milk production is greater.

溫室效應氣體

乳牛會產出沼氣，是一種溫室效應氣體。

儘管沼氣應努力減少，但牛隻的價值為利用人類不能使用的草料，兩者應可權衡相抵。

若乳牛壽命較短，則其每單位泌乳量所排出之溫室效應氣體，會比較高。

What could be the reactions of consumers if they believe that something is wrong with dairy production?

Some could stop eating dairy products.

Some could eat some of the products but not others.

Some could write to retail organisations to tell them what they will not buy.

若消費者認為乳製品生產有什麼不對勁，可能有甚麼反應？

有些人會停止食用乳製品。

有些人會食用一部分的乳製品，但其他乳製品不吃。

有些人會寫信給零售商，說明不再購買的原因。

What would be the cost to the industry of a 5% increase in vegetarianism?

What would be the cost of 20% of consumers ceasing to buy milk?

The cost of improving the image of an industry so that it could be said that the welfare of our animals is good, would be small in comparison with either of these.

The industry should be proactive and change before consumers reduce consumption.

素食主義者增加5%，對酪農業成本的影響是甚麼？

20%的消費者停止購買牛乳，對酪農業成本的影響是甚麼？

改善酪農業動物的福利，及改善產業形象的成本，與上述兩種情形發生所產生的成本，相較低廉許多。

在消費者減少乳製品之消費前，酪農業者應積極改變。

Some actions are being taken by the industry but these are not great enough at present.

In the U.K. breeding now includes the “Profitable Life Index” with lifespan of cows included as well as yield and nutrient content of milk.

Each of the main welfare problems should be added.

In Sweden, health indicators are already included.

One change in direction would be to cross with some beef breeds.

雖然酪農業已採取部分行動，但是現今來看仍差距甚遠。

現今英國乳牛的繁殖，採用“利潤生命指標”（Profitable Life Index），包含壽命、泌乳量，乳汁營養量等。

應加上每個主要的福利問題

在瑞典，健康指標已被包含在內。

讓乳牛與肉牛雜交飼養，是一個考慮方向。

In the E.U., laws relating to dairy and beef cattle include a general Directive, based on the Council of Europe Convention on the Protection of Animals Kept for Farming Purposes, and Directives on transport and slaughter and the welfare of calves.

EFSA and previous E.U. Scientific Committees have produced reports on the welfare of calves and beef cattle and on a wide range of cattle diseases.



歐盟與乳牛和肉牛相關的法令，包括：原則性指令，是以歐盟保護農場動物公約為基礎，及關於小牛運輸宰殺及福利的指令。

EFSA及前歐盟科學工作委員會，曾製作小牛及肉牛福利，及廣泛的牛隻疾病研究報告。



The welfare of beef cattle

After six months of age, beef cattle welfare is often good but problems to be considered include the following.

Effects of confinement and housing design

Management in groups

Stocking density

Consequences of genetic selection, especially fast growth effects

Flooring

Bad handling and other direct cruelty

Traceability, marking, especially branding

Breeding

肉牛的福利

肉牛在六月齡後的福利普遍是良好的，但下列問題仍需加以考量：

- 活動限制及畜舍設計的影響
- 牛群管理
- 飼養密度
- 遺傳基因篩選的後果，特別是快速成長的影響
- 地板材質
- 惡劣管理及直接施以殘酷行為
- 履歷，標記，特別是烙印
- 繁殖

Effects of confinement and housing system

Physiological responses to confinement: tethered bulls show more frequent episodes of **high blood cortisol** levels than bulls able to interact socially in groups. They also show more **stereotypies**.

Individually housed bulls:

33% spent several minutes per hour **tongue-rolling**.

□

Causes of such abnormal behaviour and physiology: social deprivation and inability to perform behaviours because of spatial restriction.

Tethered animals lack exercise and have different patterns of muscle fibres from those free to walk and more **osteocondrosis**.

活動限制及畜舍設計的影響

牛隻生理上對活動限制的反應：以繩練拴住的牛隻，比起有空間可作社交互動的牛隻，更容易有血液可體松濃度過高的情形發生。

33%個別飼養的牛隻，每小時有數分鐘翻動舌頭（**tongue-rolling**）現象。

異常行為及生理狀況的原因：社交的剝奪及空間限制而無法正常活動。

以繩練拴住的動物缺乏運動，比起行動不受限制可以自由行走的動物，有不同的肌肉纖維模式，且更容易患有軟骨相關疾病。

Management in groups

Fighting and mounting can lead to welfare problems when beef animals, especially bulls, are kept in groups.

The most important way of minimising such problems is to keep the animals in stable groups since social mixing leads to much fighting with consequent injuries, bruising and extreme physiological responses.

In stable groups, mounting may lead to more injury than does fighting. Animals that are frequently mounted become bruised and may suffer severe leg injuries.

Mounting can be greatly reduced by the use of overhead bars, which physically prevent it, or an electrified grid, which deters animals that wish to mount. However, providing space for escape from animals that mount is the best solution.

牛群管理

當肉牛，特別是公牛，被群體飼養時，牛隻打架及騎乘行為可能造成動物福利問題。

減少這類問題的最重要方法，就是盡量保持牛群的穩定性。避免不同群體的牛混養，否則容易造成牛隻受傷，挫傷，以及極端的生理反應。

在穩定的牛群中騎乘行為比打架造成更多的傷害。經常被騎乘的動物容易挫傷，且遭受腿部嚴重受傷的痛苦。

使用頭頂欄杆（overhead bars），可大量減少騎乘行為；或通電鐵絲網，可震攝意圖騎乘的動物。但提供動物與動物間，可以足夠互相避開的空間，是最佳解決方法。

Stocking density

High stocking densities lead to increased aggression, injury and bruising.

At high stocking densities beef cattle :

- may have insufficient space for exercise,
- are often unable to fulfill other needs e.g. showing normal social responses,
- and as a consequence may show more aggression and mounting.

The space allowance at which production is reduced and indicators of poor welfare increase substantially is 4 m² per animal. However, more space is required for normal behaviour to occur. Trough space below 0.75m per animal causes problems.

飼養密度

高密度的飼養容易增加動物的攻擊性，受傷及激烈挫傷。

高密度飼養肉牛：

- 不夠充足的運動空間
- 無法滿足其他需求 例如展現正常的社交反映
- 因而造成更高的攻擊性及騎乘行為

導致動物福利不良及動物產能降低的活動空間，大致上是每頭動物 4 平方公尺大。要動物有正常行為，更大的充分空間有其必要。飲水槽空間少於 0.75 平方公尺／每頭動物，會引發許多問題。

Consequences of genetic selection, especially fast growth effects

Genetic selection for increased productivity, e.g. fast growth and high body weight, can lead to poor welfare in the animals because of:

cartilage damage,
□ limb pain and
difficulties in walking.

Beef animals increase rapidly in body weight but they have little exercise if they are housed in small pens and their leg growth may not be able to keep pace with that of the rest of the body.

遺傳基因篩選後果，特別是快速生長的影響

以增加產能為目的進行基因篩選，例如快速成長及高體重，可能因下列因素造成動物不良福利：

- 軟骨組織損害
- — 腳痛
- 不良於行

肉牛快速增加體重但少有運動，若被飼養在狹小畜欄中，其腿部成長可能較身體其他部位的成長速度緩慢。

Flooring

Slatted floors can sometimes lead to increased **foot and leg problems**.

These problems are less if fattening bulls are reared on deep straw and such conditions also lead to fewer **behavioural problems**.

Beef cattle have a strong preference for straw or other bedding.

地板材質

板條地板常造成腿足疾病的增加。

將肥育牛隻飼養在鋪滿厚稻草的環境中，可以減少異常行為的問題。

肉牛特別喜愛稻草或其他材質的墊料。

Bad handling

The driving, catching and handling of cattle can lead to fear, bruising and other injury.

- With appropriate previous experience, cattle can be less fearful of humans.

惡劣的驅趕

驅趕，捕捉及搬運牛隻，可能造成牛隻恐懼，挫傷及其他傷害。

- 先前經歷過適當經驗的牛隻，對人類較不會產生恐懼。

Bad handling and other direct cruelty

For example, transporting animals that can't stand (as occurred in the Hallmark Meat episode).

- Animals that can't stand or have difficulty in locomotion could have *E. coli* infection, or Salmonella infection, or B.S.E.

惡劣的管理及其他直接殘酷行為

例如：在運輸過程中動物無法站立（如同在HALLMARK肉品事件一樣）

- 動物無法站立或有移動困難，可能感染大腸桿菌，沙門氏菌，或 B.S.E.。

Marking, especially branding

If animals can be traced, the sources of animal disease outbreaks are more likely to be found.

If animals may get **infectious diseases**, such as foot-and-mouth disease, tracing of the animals is important for economics and animal welfare.

When an animal is found at a slaughter-house with **bruises, skin lesions, or DFD meat**, the welfare of the animal at various stages in its past can be deduced.

The negative aspect of marking occurs when the method causes pain or other poor welfare to the animals.

Hot-iron branding will always cause **prolonged pain** so should not be used.

Other marking methods should be used only if the effect on welfare is slight.

標記，特別是烙印

若動物可以追蹤，爆發動物疾病的來源則較容易發現。

若動物可能感染傳染性疾病，如口蹄疫等，則履歷追蹤對經濟及動物福利就相對重要。

□在屠宰場的動物被發現有挫傷，皮膚損傷，或暗乾肉（DFD），則可斷定該動物到屠宰場之前的各階段動物福利不良。

標記的負面影響，在於過程造成動物疼痛，或其他福利不良。

以熱鐵烙印一定會造成動物長久的疼痛，應予停止。

僅對動物福利有微不足道影響的標記方法，才建議使用。

Breeding

Joint disorders and other leg problems are important causes of poor welfare.

Their causation includes selective breeding for muscle mass, fast growth rate and food conversion efficiency.

Hence conventional breeding methods need to be changed to take account of consequences for welfare.

□

Transgenic animals and cloning

Genetic modifications in animals can:

- benefit the animals, e.g. confer disease resistance
- help to treat human disease
- develop new products for other purposes
- increase efficiency of animal production.

Some people accept none of these. Few people accept the last two as sufficient justification for genetic modification. A major reason is that animal welfare may be poorer.

繁殖

關節疾病及其他腿足問題，是導致不良福利問題的重要因素。

它們的因果關係包含，為了較大量肌肉，快速成長率，及飼料轉換率之選擇性繁殖。

因此傳統繁殖方式必須改變，應把福利產生的影響納入考量。

遺傳工程的動物及複製動物

□ 動物基因改造可能：

- 使動物受惠，如賦予疾病抵抗力等
- 幫助治療人類疾病
- 為其他目的研發新產品
- 增加動物生產的效能

一部分人無法接受上述基因改造的好處。少部分人接受其中幾項因為有好的理由。主要無法接受的原因，是基因改造可能會造成更惡劣的動物福利。

Conclusions: dairy cows and heifers

The dairy industry should rapidly change policies relating to animal welfare and other aspects of sustainability.

In relation to the impact of animal genetics on the welfare of the animals, cooperation between industry and scientists is essential.

For **adult beef cattle**, genetic selection has important adverse effects on welfare, and there should be less selection for fast growth.

Calves and older, some housing conditions cause very poor welfare, including individual pens and those with fully-slatted floors and no manipulable material.

Too high a stocking density, poor management in groups, inadequate traceability, bad handling and unnecessary painful treatment such as hot-iron branding should all cease.

結論：乳牛及小母牛

酪農業應迅速改變其動物福利及其他永續經營的政策。

有關動物基因對動物福利的影響，產業與科學家的合作，不可或缺。

對成年肉牛而言，基因篩選對動物福利有反面的影響，尤其是應減少快速成長的基因篩選。

對小牛及較大的牛而言，一些畜舍環境造成非常糟的福利條件，包含個別畜欄，全為板條的地面，及沒有可操弄玩耍的物料。

飼養密度過高，不良的牛群管理，不適當的履歷標識，惡劣的驅趕，及其他不必要、疼痛難當的作業，如用熱鐵烙印等，應全部停止。

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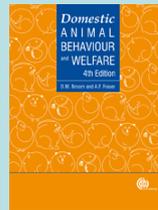
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CABI.

Pig welfare



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豬的動物福利



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Pig welfare issues include:

housing

mutilations

handling and transport

slaughter

genetic selection

genetic modification

豬的動物福利 包括下列議題：

欄舍

手術

驅趕及運輸

屠宰

基因篩選

基因改造

Biological characteristics of *Sus scrofa*

- a). Ancestor, readily feral, size change.
- b). Social, temperature control –wallow.
- c). Food, sensory nasal disc.
- d). Exploration, anti-predator, dunging.
- e). Social, sexual, fighting.
- f). Pregnancy 115 days, nest-building, parturition,
- g). Piglet needs colostrum, awaits milk ejection, massages.

豬的生物特徵

- a). 原始，天生野性（readily feral），體型改變
- b). 群居性，泥中打滾以調節體溫
- c). 以鼻中嗅覺組織，感應食物所在
- d). 喜探索，對抗掠食者，大小便
- e). 社交，性交，好鬥
- f). 懷孕期約115天，築巢，分娩
- g). 仔豬需食初乳，等待乳汁分泌

Pig welfare questions 1

What flooring is the minimum requirement for pigs?

Relevant needs here include:

a certain degree of comfort / avoidance of injury

sufficient cleanliness to minimise disease risk

the possibility to thermoregulate

possibilities for manipulation

豬的動物福利問題1

豬對地板的最低需求為何?

相關需求包括:

提供一定程度的舒適/避免受傷

環境充分潔淨，足以降低疾病感染之風險

滿足豬隻體溫調節之需求

提供好奇操弄的機會

Pig welfare questions 2

Should pigs be kept in tactile, visual, or olfactory isolation?

豬的動物福利問題2

豬是否應被飼養於觸覺、視覺、或嗅覺隔離的空間？





Pig welfare questions 3

Should pigs be mixed and if so, how: very young piglets

3-5 week piglets

10 week + piglets

gilts and sows

Should tranquillising drugs be used?



豬的動物福利問題3

豬應混養嗎？若是，如何做：仔豬

3-5週齡仔豬

10週齡以上仔豬

女豬與懷孕母豬

是否該使用鎮靜藥物？



Pig welfare questions 4

Do pigs need light? If so, for how long and how bright?

What sound levels should be permitted in pig housing?

What NH_3 , CO_2 , CO , H_2S levels should be permitted in pig housing?

豬的動物福利問題4

豬是否需要光線？提供光線的時間及亮度應如何？

豬舍裡適當的音量許可程度應如何？

豬舍裡空氣中適當的 NH_3 ， CO_2 ， CO ， H_2S 許可含量應是多少？

Pig welfare questions 5

- How much living space should be provided for pigs
- 3-5 weeks?
 - 10 weeks?
 - 30-110 kg?
 - sows?
 - boars?

豬的動物福利問題5

- 豬隻適當的生活空間應有多大？
- 3-5週齡？
 - 10週齡？
 - 30-110公斤體型
 - 懷孕母豬？
 - 公豬？

Pig welfare questions 6

What should be changed in pig breeding?

Muscle size

Cardiovascular

Other physiology/carcass

Prolificacy

Behaviour

豬的動物福利問題6

豬的育種應改變甚麼？

肌肉大小

心血管系統

其他生理機能/骨架

多產性狀(繁殖性狀)

行為模式

Pig welfare questions 7



Should sows be kept individually? In what conditions?

How much food should sows be fed? What kinds of food?

Should any sow housing condition be banned?

豬的動物福利問題7



懷孕母豬是否應單獨隔離？應隔離於何種環境？

該餵食懷孕母豬多少食物？餵食何種食物？

何種飼養懷孕母豬之環境條件應予「禁止」？

Dry sow housing systems

Tethers

Stalls

Group with individual feeding stalls

Group with widely distributed or slowly delivered food

Electronic sow feeder (ESF)

Outdoor with arks, houses.

乾母豬欄舍系統

拴繩

夾欄

群居，但個別餵食的欄舍

群居，且有分送範圍大，或緩慢提供之食物

電子母豬餵食器

戶外有遮蔽所，畜棚









Group-housed sows with feeding stalls can share feeding stalls and feed at different times.

Electronic sow feeders: earliest were rear entry and exit, originally fed several times per day and mixed sows from different sources.

Now have front exit, once per day feeding, return sows to same group.

Familiarise new sows/gilts before entry.

群飼於具有獨立餵食系統欄舍的孕豬，可於不同時間輪流餵食。

電子餵食器：最早期之出入口在後方，起初一日餵食多次，且將來自不同群體的母豬混養。

出入口現於前方，一天餵食一次，母豬回到原群體中。

讓新來母豬及女豬在進入餵食欄前，先互相熟悉親近。

Pig welfare questions 8

What enrichment of the environment is essential or desirable for sows, young pigs, and boars?

豬的動物福利問題8

對懷孕母豬、仔豬及公豬，何種環境豐富性是必須的？



Costs of group-housing and stall-housing of sows
(from E.U. Scientific Veterinary Committee Report)

	Individual	Group
Building investment per sow (euros)	2617	2564
Housing cost per sow per year (euros)	354	346
Total cost per piglet sold (euros)	56.71	56.37
Labour cost as ratio	100	108
Fattening pig: cost per kg (euros)	1.580	1.576

懷孕母豬群飼或夾欄飼養的成本

(資料來源: 歐盟科學獸醫委員會報告)

	單獨	群飼
- 每頭母豬建造投資成本(歐元)	2617	2564
每頭母豬每年畜舍成本(歐元)	354	346
每頭售出仔豬成本(歐元)	56.71	56.37
人工成本比	100	108
肥育豬:每公斤成本(歐元)	1.580	1.576

Pig welfare questions 9

What conditions are best for farrowing sows and their piglets?

Should any farrowing housing condition be banned?

豬的動物福利問題9

什麼條件為分娩母豬，及其仔豬之最佳環境？

何種分娩畜舍環境或條件應被「禁止」？

What does the sow need? What do piglets need?

Evidence: sow behaviour in semi-natural conditions,
indicators of poor welfare in sows,
indicators of poor welfare in piglets
including mortality, morbidity,
problems after weaning.

懷孕母豬、仔豬，各有什麼需求？

證據：孕豬在半自然環境中之行為表現

孕豬動物福利不佳之指標

仔豬動物福利不佳之指標

包含發病率，死亡率，及離乳後的問題等











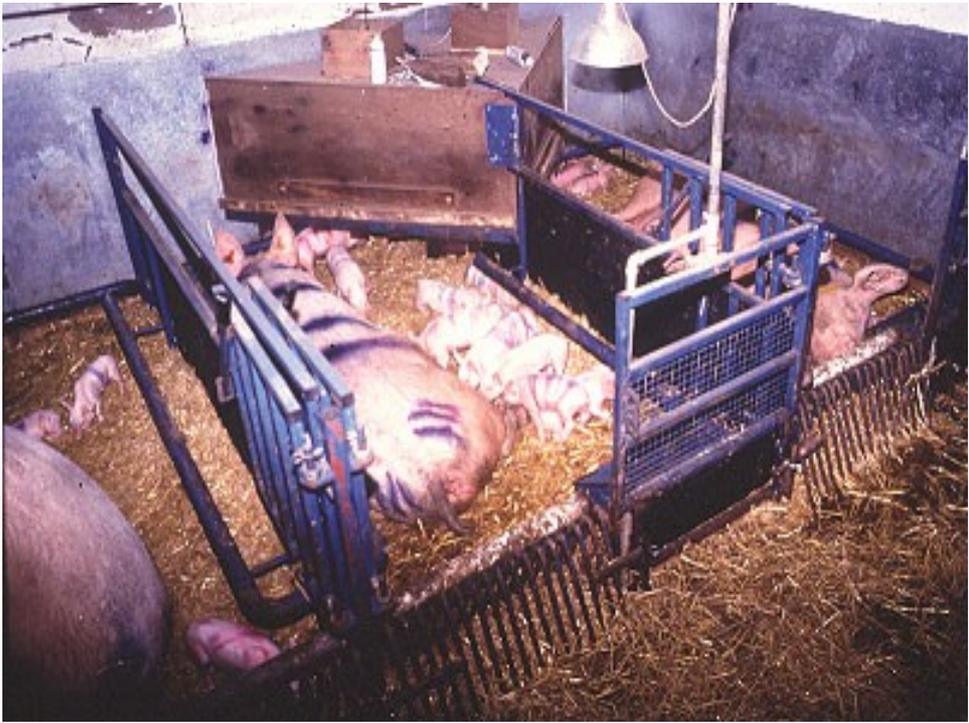












The deep straw Thorstensson system : group farrowing of sows (e.g. 8), pen walls removed at 2 weeks, sows removed at 5 weeks, no weaning check ——welfare good but some piglets still crushed on concrete floor below straw.

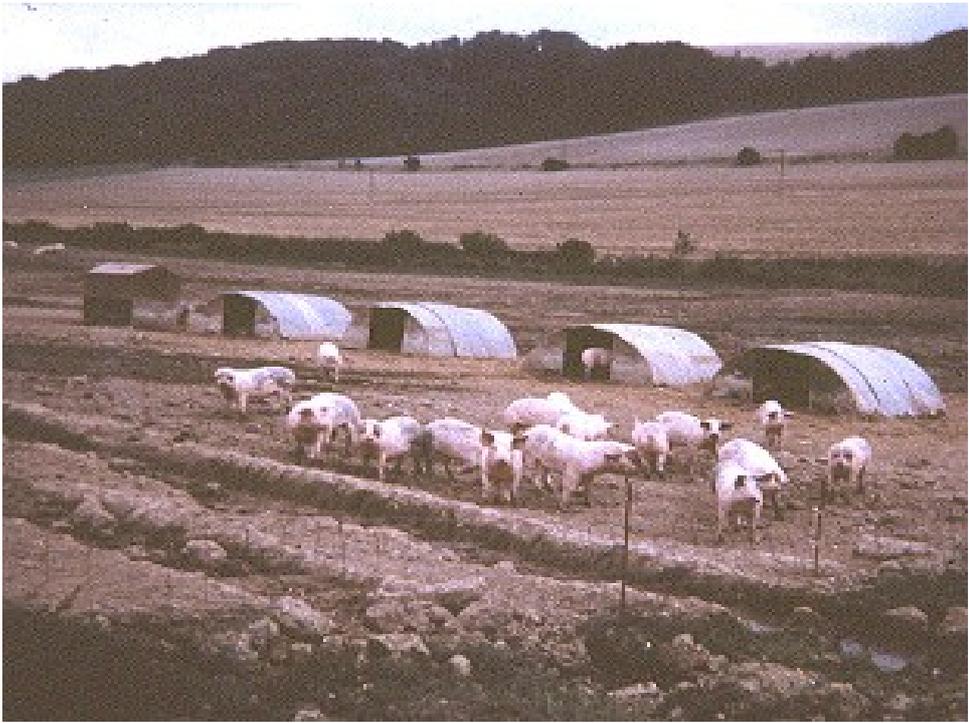
Piglet mortality in U.K., % of piglets born alive:

Farrowing crates	11.6
Field with arks	11.5
Modified crates	20+
Thorstensson	15
Pens with rails	12 -17

深厚稻草Thorstensson系統：群居分娩母豬（例8隻），仔豬兩週齡後移除柵欄，五週齡與母豬分開，不做離乳檢查，雖福利良好但仍有仔豬被壓死在深層稻草下的水泥地上

英國仔豬死亡率，占出生活胎仔豬之百分比：

分娩欄	11.6
分娩小屋	11.5
改良分娩欄	20+
Thorstensson系統	15
活動欄	12-17



Comparison of outdoor and indoor pigs

	<u>Outdoor</u>	<u>Indoor</u>
Litters per sow per annum	2.21	2.36
Piglets born alive per litter	11.2	10.6
Piglets weaned per litter	9.6	9.3
Sow feed tonnes per sow per annum	1.44	1.23

戶外及室內飼養豬隻比較：

	<u>戶外</u>	<u>室內</u>
每年母豬生產胎數	2.21	2.36
每胎仔豬存活率	11.2	10.6
每胎仔豬離乳率	9.6	9.3
每頭母豬每年飼料噸數	1.44	1.23

Pig welfare questions 10

When should piglets be weaned?

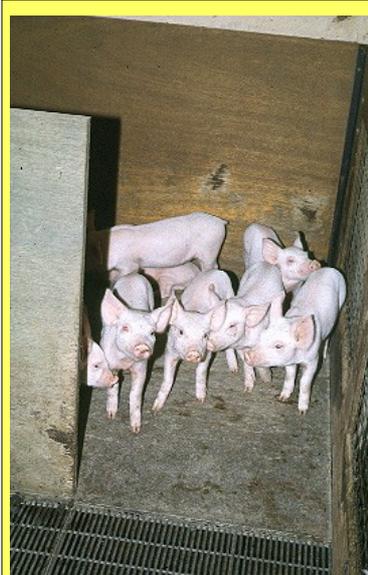
What should be provided after weaning?

豬的動物福利問題10

仔豬應於何時離乳？

離乳後應提供何種食物？





Barrier No Barrier

Aggression	5.4	8.9
Belly nosing	1.56	3.24
Wt gain kg/wk	1.52	1.30

Weaker piglets use the barrier most.

Waran and Broom 1993



柵欄 無柵欄

攻擊性	5.4	8.9
假吮乳	1.56	3.24
每週增重(公斤)	1.52	1.30

瘦弱仔豬常來自柵欄飼養

Waran and Broom 1993

Pig welfare questions 11

Do pigs feel pain?

Should any of the following be banned or discouraged:

castration, tail docking, tooth clipping or grinding,

nose ringing, ear tagging or notching,

insertion of electronic identifiers?

豬的動物福利問題11

豬隻有痛覺嗎？

下列哪些手術操作，應予「禁止」或勸阻：

去勢，剪尾，剪齒或磨齒

穿鼻環，打耳標或耳刻

植入電子辨識器？

Castration of boars: carried out at a few days of age

usually no anaesthetic or analgesic
so causes poor welfare in the piglets.

Why castrate? **Boar taint** - meat in 100kg + male has less
androstenone and skatole in castrates.

But ————— intact boars have less fat

intact boars grow 7% faster to 100kg.

公豬去勢通常在出生數日後，無麻醉或止痛即施行，造成仔豬福利不良。

為何去勢？公豬味（Boar taint），每100kg的公豬肉去勢後費洛蒙及糞臭氣較少。

但——

未去勢的公豬油脂較少，長到100KG的成長速度比去勢公豬快7%。

Report of European Food Safety Authority
Scientific Panel on Animal Health and Welfare

**The welfare of weaners and rearing pigs:
effects of different space allowances and floor types.**

November 2005

Main Conclusions and Recommendations:

Pigs use and need separate areas for lying and for urination and defaecation, except when it is too hot, or when there is too little space, or when the pen design is poor.

Straw or other suitable material should always be provided.

Design and management of floor should allow adequate removal of faeces.

歐洲食品安全管理局 動物健康及福利科學小組

離乳仔豬及飼養豬隻之福利：不同的活動空間及地板種類的效果

November 2005

主要結論與建議：

除非環境過熱、空間過小，或空間設計不良，豬隻習慣使用不同區域躺臥及排泄。

稻草麥桿或其他合適的材料，應隨時提供。

地板應有打掃排泄物的合宜設計，及空間運用。

EFSA Panel Report: Main Conclusions and Recommendations:

Space allowance and floor quality should be such as to provide for the needs of pigs, including the need for material to manipulate. This reduces belly-nosing and tail-biting.

Overcrowding increases disease risk and other causes of poor welfare.

Space allowance ($A \text{ m}^2$) can be expressed as $A = k \times W^{0.67}$
(W is weight in kg)

Figures given for limits.

EFSA 調查報告：主要結論與建議

豬隻的需求包括適當活動空間及地板品質，以及可供操控玩耍的材料。如此可減少假吮乳及啃咬尾巴之行為

飼養空間過度擁擠增加染病風險，且成為引發其他讓福利不良的因素

適當空間之計算公式 $A = k \times W^{0.67}$
 W 指重量（公斤為單位）

Figures given for limits.

Poultry Welfare

1. Laying hens



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家禽福利

1. 蛋雞



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Hens need to:

1. obtain adequate nutrients and water,
2. grow and maintain themselves in such a way that their bodies can function properly.
3. avoid damaging environmental conditions, injury or disease, and
4. be able to minimise the occurrence of pain, fear and frustration.

母雞需要：

1. 獲得充足的營養與飲水
2. 可讓身體功能獲得適當發揮的成長環境
3. 避免有受傷或染病可能性的環境條件
4. 盡可能減少疼痛，恐懼以及挫折感的發生

In order to achieve these ends, hens carry out a variety of activities, respond to certain stimuli and maintain certain physiological states.

Hence they have other needs such as to:

5. show certain foraging and investigatory movements,
6. have sufficient exercise,
7. show preening and dust-bathing behaviour,
8. explore and respond to signs of potential danger,
9. interact socially with other hens,
10. search for, or create by building, a suitable nest-site.

為了達到這些目的，母雞會進行各式各樣的活動以回應刺激，並維持某個程度的生理狀態。除此之外，牠們也有其他需求，例如：

5. 展現一定程度覓食跟探索活動
6. 充足的運動
7. 梳理羽毛以及沙浴的行為
8. 發現潛在危險的徵兆並做出反應
9. 與其他雞隻社交互動
10. 尋找或建立適合築巢的地點

Key issues for good design of accommodation for laying hens

Space for exercise, normal behaviour and bone strength

Investigatory pecking and dust-bathing

Perching

Lighting

Provision of nesting place (and nesting material)

Beak-trimming

良好蛋雞飼養環境設計的關鍵議題

運動空間，正常行為以及骨骼強度

探索性的啄食，以及沙浴

棲架

光線

築巢地點（以及築巢材料）

剪喙

Area required by hens for different behaviour patterns (cm²).

Standing	428 - 592
Turning	771 - 1377
Preening	818 - 1270
Ground-scratching	540 - 1005
Wing-stretching	653 - 1118
Wing-flapping	860 - 1980

(Dawkins and Hardie 1989)

母雞不同行為模式所需的區域大小（單位：平方公分）

站立	428 - 592
轉身	771 - 1377
羽毛梳理	818 - 1270
抓地	540 - 1005
伸展翅膀	653 - 1118
拍動翅膀	860 - 1980

(Dawkins and Hardie 1989)

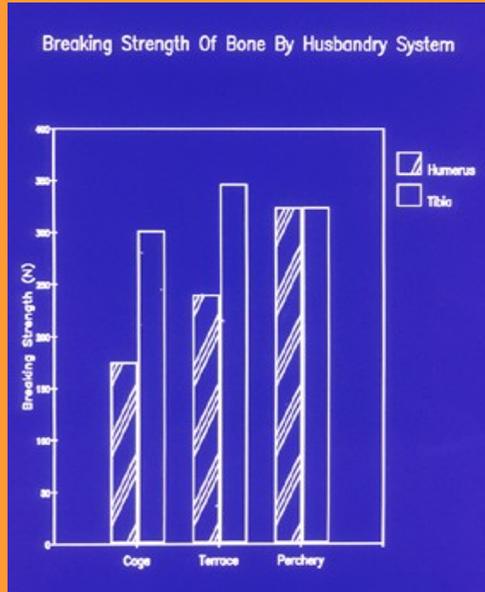
Space required for hens in a cage holding five birds.

	cm ² used	space per bird
4 hens crowded together plus 1 wing flapping	2720	544
4 hens crowded together plus 1 wing stretching	2185	437
4 hens crowded together plus 1 preening	2342	468
3 hens crowded, 1 turning, 1 wing flapping	3469	694
2 crowded, 2 turning, 1 wing flapping	4218	844
4 hens standing, preening	3074	615
4 hens standing, 1 wing flapping	3460	692
2 hens standing, 2 turning, 1 wings stretching	4050	810
2 hens standing, 2 turning, 1 wing flapping	4584	917

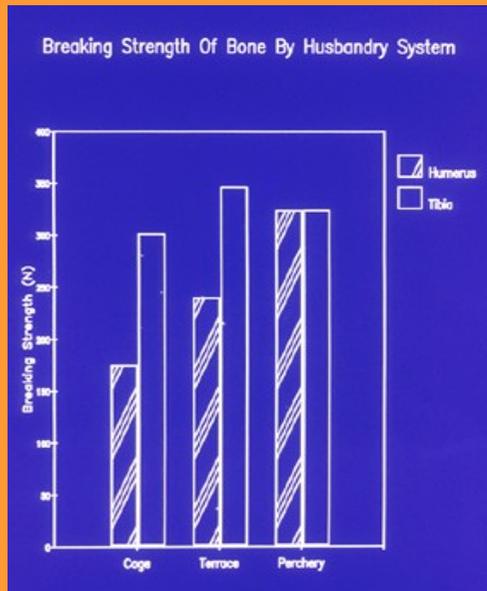
每籠飼養5隻雞所需的空間

	平方公分	每隻雞的空間
4隻雞擠在一起，1隻雞拍打翅膀	2720	544
4隻雞擠在一起，1隻雞伸展翅膀	2185	437
4隻雞擠在一起，1隻雞梳理羽毛	2342	468
3隻雞擠在一起，1隻雞轉身，1隻雞拍打翅膀	3469	694
2隻雞擠在一起，2隻雞轉身，1隻雞拍打翅膀	4218	844
4隻雞站著並梳理羽毛	3074	615
4隻雞站著，1隻雞拍打翅膀	3460	692
2隻雞站著，2隻雞轉身，1隻雞伸展翅膀	4050	810
2隻雞站著，2隻雞轉身，1隻雞拍打翅膀	4584	917

Hens from battery cages have weak bones because of lack of exercise.



飼養在雞籠裡的母雞因為缺乏運動，導致骨骼脆弱。



Number of birds per group : welfare.

In cages, when more than four birds present, increased group size leads to more fearfulness, aggression, feather-pecking, cannibalism and adrenal weight and poorer egg production per bird (11 papers).

Feather pecking increases in a linear way with group size in cages.

In pens with a solid floor the effect of group size depends on design.

Commercial Tiered Wire Floor units in Holland with about 7,000 - 10,000 birds per unit have levels of feather pecking and cannibalism less than or similar to those in cages.

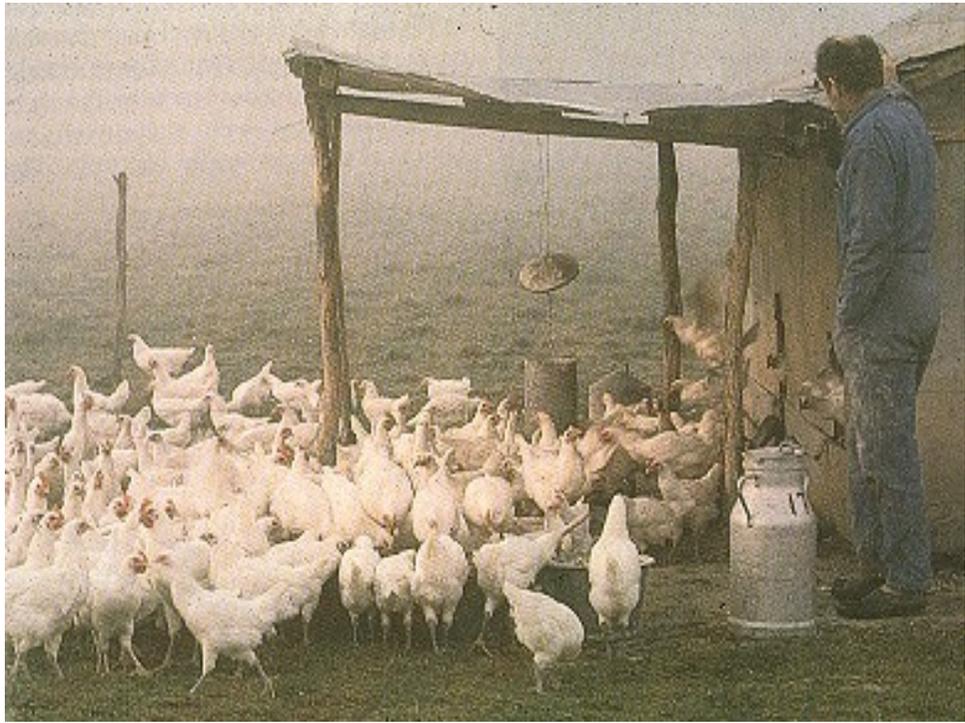
每群雞的隻數：福利

籠飼如果多於4隻雞，會引起恐懼，暴力，啄羽，同類相殘，腎上腺素分泌增加，以及每隻雞的產蛋量下降 (11篇論文報告)。

「啄羽」現象會因籠中動物數量增加而增多。

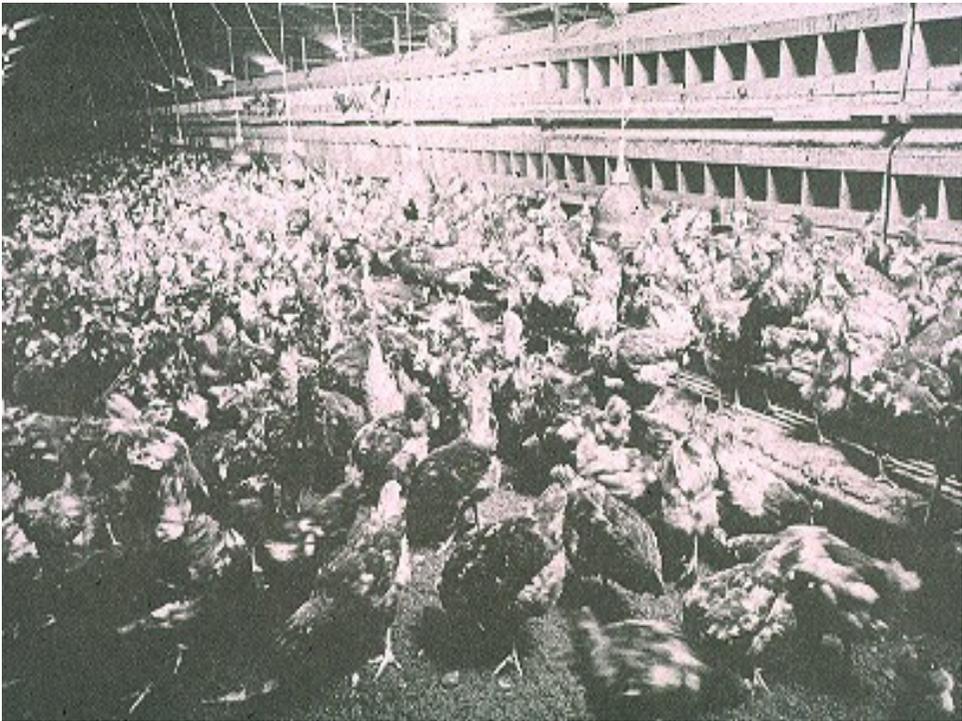
在堅固地板的欄舍中，動物數量的影響與設計有關。

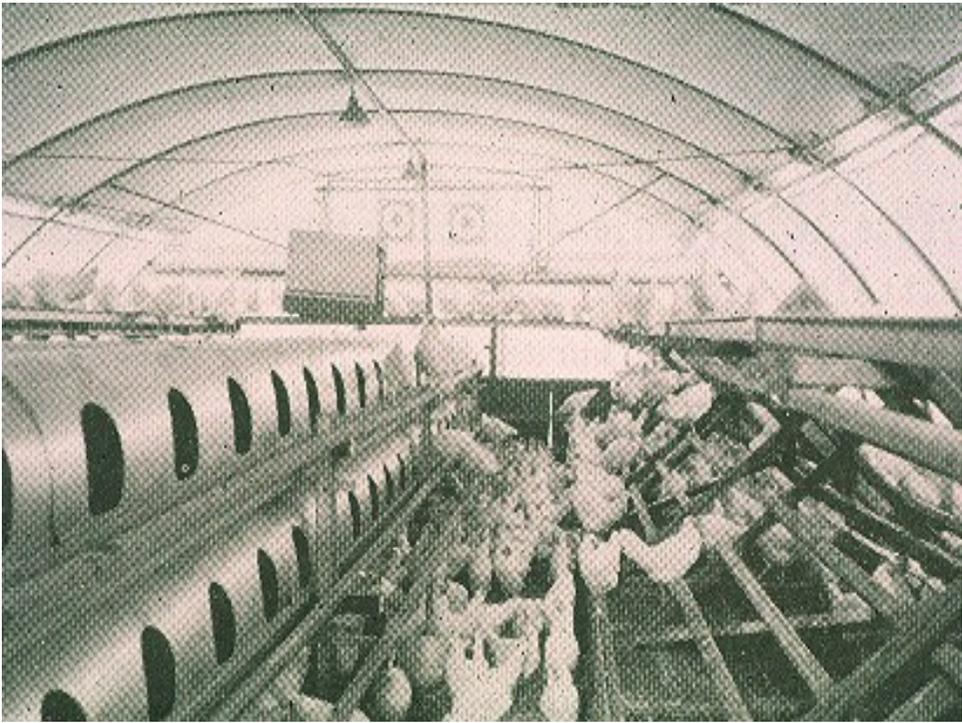
荷蘭「多層網板式」的商業飼養場，每單位雞舍大約飼養7,000 – 10,000隻雞，發生啄羽以及同類相殘的機會，少於或相近於飼養在籠內的情況。

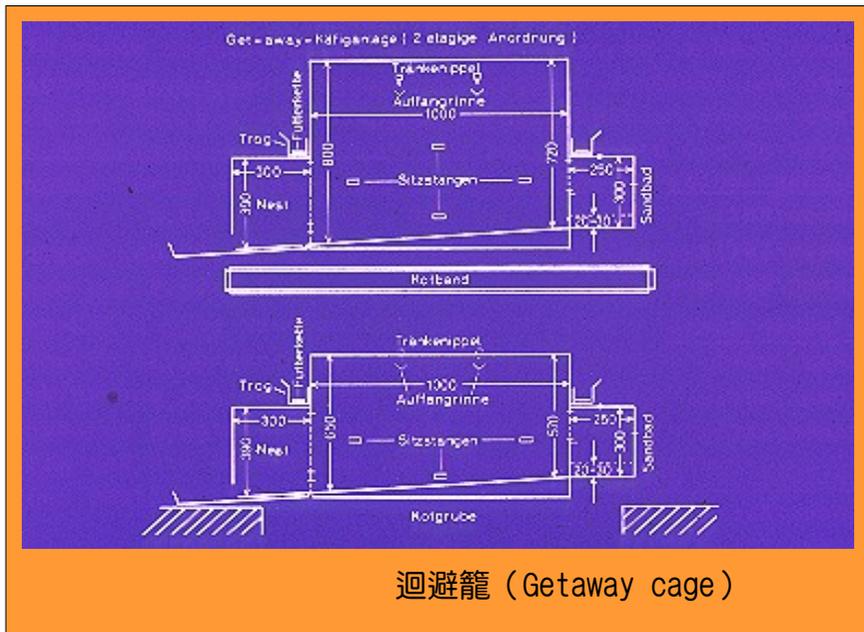
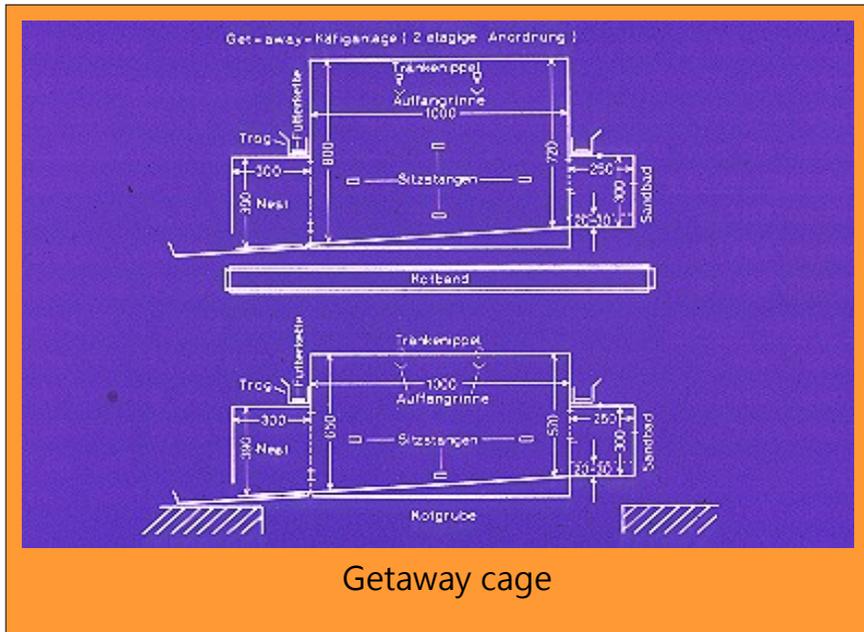












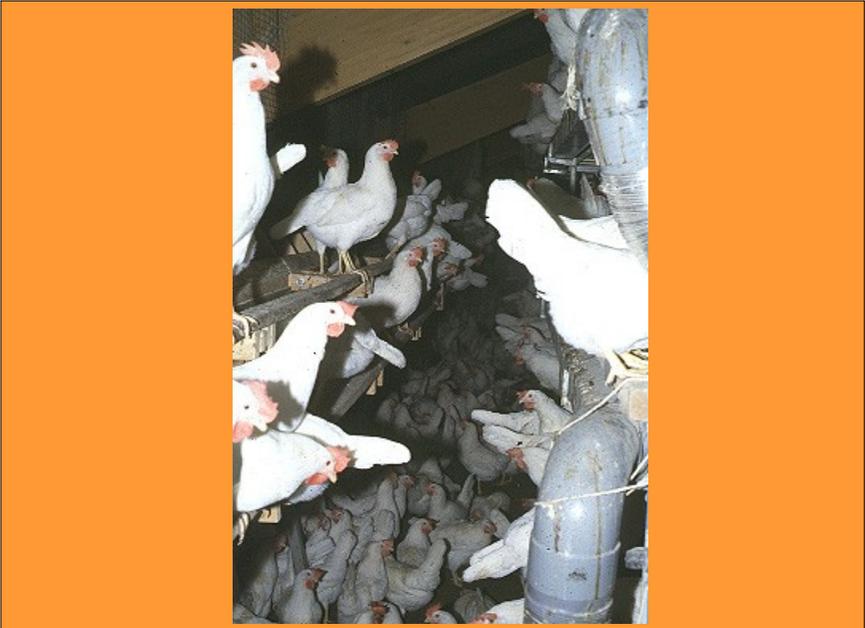


Tiered Wire Floor
System

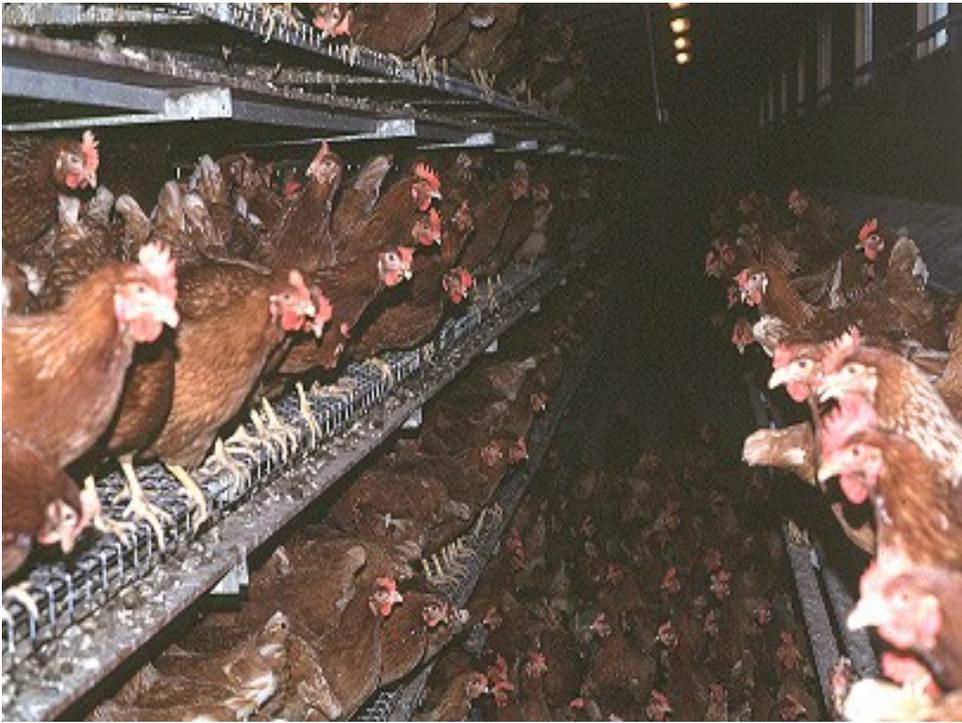


多層網板飼養系統































Costs of battery cage, extended cage and aviary production

Comparisons with 450 sq. cm. cage.

Increase space in battery cage from 450 to 550 sq cm per hen	+5%
Extended cage	+10-20%
Aviary	+5-8%
Deep-litter	+17%
Free range	+45%

格子籠，加大籠以及平飼飼養系統的成本

與每格450平方公分的格子籠比較

飼養籠的空間由450平方公分 增加到550平方公分	+5%
加大籠	+10-20%
平飼	+5-8%
深墊料	+17%
放牧	+45%

Poultry Welfare

2. Broilers



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家禽福利

2. 肉雞



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Key issues for good design of accommodation for broilers

Physical conditions good enough

Stimulation of locomotion –complex enough environment

Sufficient space for movement

Genetic selection which minimises leg disorders and ascites

良好的飼養肉雞環境設計的關鍵議題

健康狀況良好

運動刺激－複合的環境

可供活動的充足空間

進行基因篩選以減少腳部不良及腹水

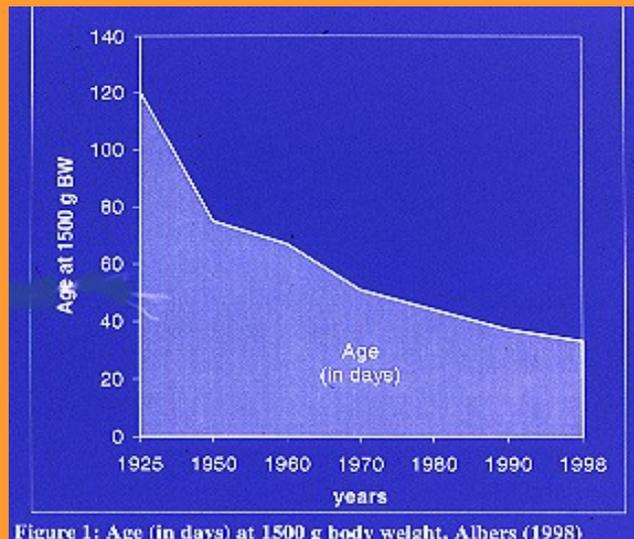


Figure 1: Age (in days) at 1500 g body weight, Albers (1998)

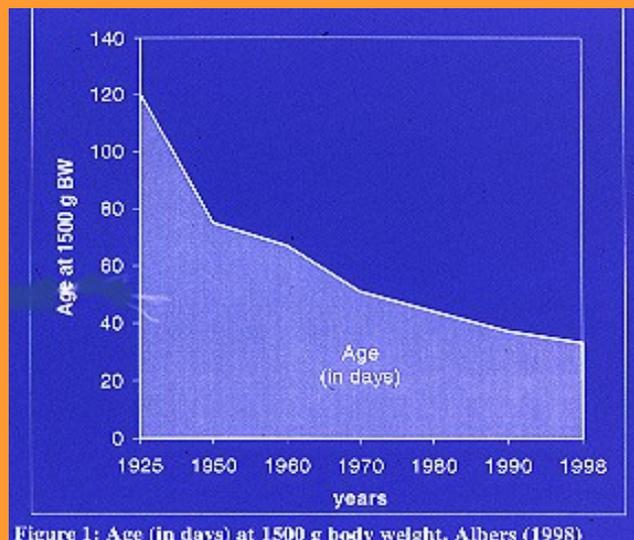
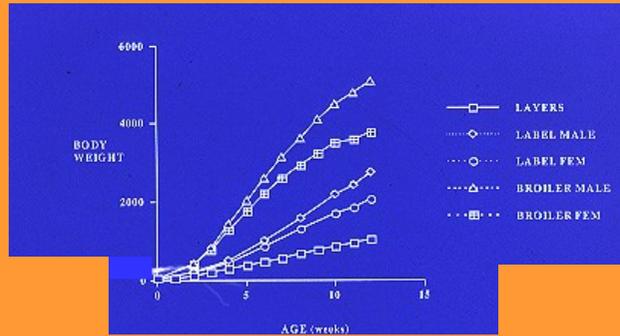
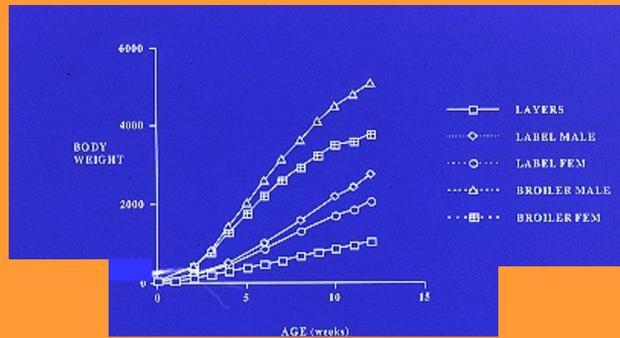


Figure 1: Age (in days) at 1500 g body weight, Albers (1998)



Growth curves of broilers



Growth curves of broilers

肉雞的成長曲線

<u>Light level</u>	: effects on welfare of broilers
below 1 lux	: eye abnormalities chicks may not find food
below 5-6 lux	: lower activity more breast blisters and mortality
below 20 lux	: more fearful
below 50 lux	: lower activity,scratching, dust-bathing
above 50 lux	: no problems reported.

<u>光線強度</u>	: 對肉雞動物福利的影響
低於 1燭光	: 眼部功能異常 小雞有可能找不到食物
低於5—6燭光	: 活動力低 較易引發胸部水泡及死亡
低於20燭光	: 較易引起恐懼
低於50燭光	: 活動力低，抓扒，沙浴
高於50燭光	: 沒有任何問題回報

Ways of reducing leg problems in broilers:

Select for slower growth

Select for stronger legs

Feed less or lower quality diet

Encourage activity e.g. by lower stocking density

brighter lighting

greater environmental complexity

減少肉雞腳部疾病的方法：

篩選成長較慢的品種

篩選腳部較強壯的品種

減少餵食或是降低食量

鼓勵動物活動，例如：降低飼養密度

調高亮度

增加環境的複雜度

Stocking density effects on welfare of broilers:

comparing 25 with 40 kg per sq m

more litter moisture and contact dermatitis

more heat stress, dust, mortality

walking ability impaired

locomotion reduced

disturbance when walking increased

飼養密度對肉雞動物福利的影響

每平方公尺25與40公斤的比較

較多的糞水，並引起接觸性皮膚炎

較嚴重的熱緊迫，灰塵以及死亡率

行走能力受損

活動量減少

走動增加帶來干擾

Broiler chickens



Normal

Ascites

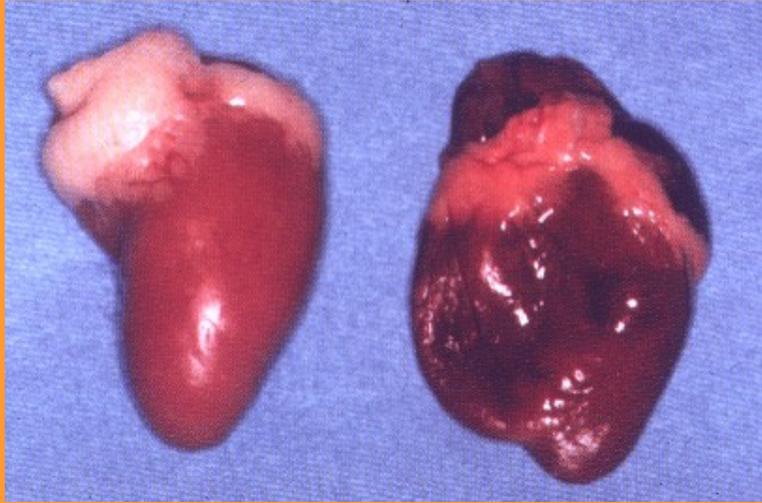
肉雞



正常

腹水

Broiler chicken hearts



Normal

Ascites

肉雞的心臟

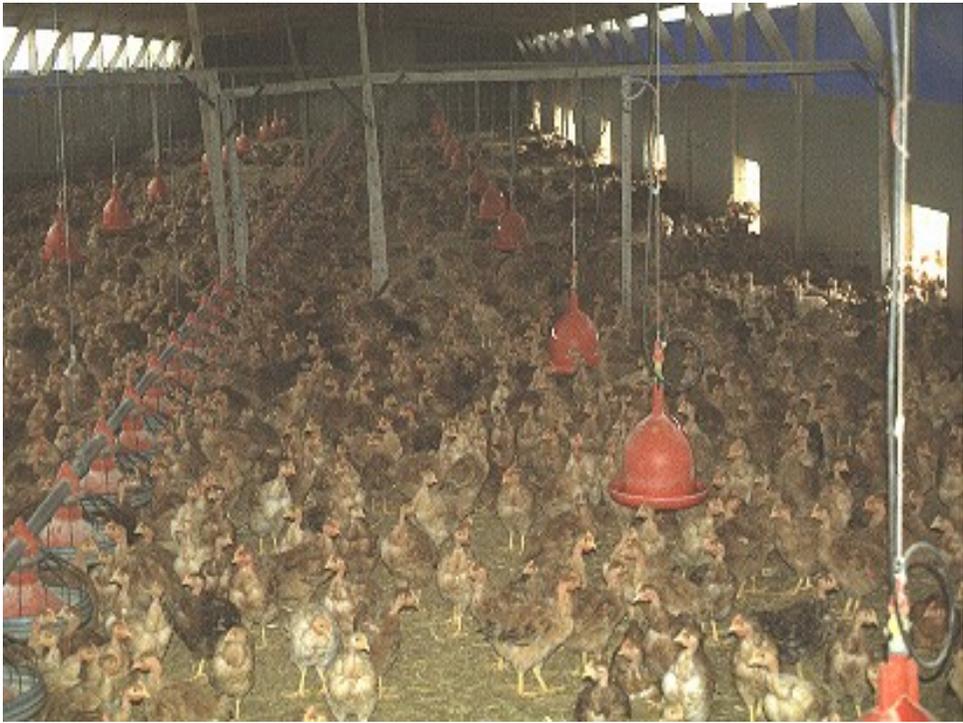


正常

腹水

Free-range broilers need good housing and should be selected for different qualities from those of indoor birds.

放牧的肉雞需要較好的飼養環境，
並挑選不同種類禽鳥的特質。





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劍橋大學「動物福利科學教授」的設置及其影響

資料來源: Donald Broom, 2012

Colleen Macleod 女士在 1985-6 年間，捐贈一筆錢給劍橋大學獸醫學系，設立「動物福利科學教授」一職，她的善舉嘉惠了無數動物生命。自從 Donald Broom 教授在 1986 年成為全球首位動物福利科學教授，他的研究工作吸引了高度的社會注目，成為許多廣播及報章雜誌報導的主題，大幅提高世人對科學及福利問題的意識。最近在英國播出的節目就有高達六百萬的觀眾收看。

自 1986 年以來，動物福利在劍橋大學的直接影響下，迅速發展成為一種學科。以此主題發表在優良科學期刊之論文數量也成長 20 倍。現今全球已有 25 位動物福利科學教授，另有 30 位教授以此議題為主要研究領域。英國、歐洲以及全球其他國家的社會大眾，對動物福利的科學研究也有愈來愈多的認識。而政府也開始運用具有科學根據的資訊，進行動物福利的相關立法。自 1986 年起，Broom 教授的「動物福利及人與動物互動學研究中心 (CAWA)」，已經出版了 443 篇期刊論文及 25 本書籍，其中不乏被拿來教授動物福利的教科書。

自 1990 年起，許多歐盟所制定的法規命令，係根據 Broom 教授擔任主席或副主席之相關委員會所發表的科學報告。例如 1990-7 年的歐盟科學獸醫委員會動物福利小組，1997-2003 年的歐盟動物健康及福利科學委員會。以及 2003-2009 年 Broom 教授擔任副主席的歐洲食品安全管理局 (EFSA) 動物健康及福利科學小組，這個小組曾提供歐盟有關禽流感、口蹄疫、藍舌病，及一般福利議題之研究報告。歐盟法令包括禁止小牛肉(veal calf crates)、母豬夾欄(sow stalls)及蛋雞格子籠(battery cages for laying hens)等。也針對動物在運輸、屠前驅趕及實驗過程中的福利問題，制訂改善措施。

Broom 所帶領的工作團隊曾提出下列動物福利相關的研究報告：小牛的飼養、動物運送、生長激素 (BST) 與人類健康、豬隻飼養空間及地表，豬隻肥育；研究範圍還包括哪些實驗動物需要被保護，人工飼養鮭魚及乳牛的福利。Broom 的工作小組也參與其他議題的研究：豬隻福利，鵝肝，鳥類圈養、禽流感，養殖鮭魚，牡蠣病毒及採集鵝毛的相關福利問題。全球推廣動物福利的重鎮，現已轉移到世界動物衛生組織(OIE)身上，Broom 擔任 OIE 四個科學工作小組中有關陸地動物運輸的主席。因為 Broom 教授也是英國環境、食品與鄉村事務部 (DEFRA) 農場動物福利委員會 (FAWC) 及內政部動物實驗管理委員會 (Home Office Animal Procedures Committee) 的成員，劍橋大學可說在動物福利立法的研究上有相當深遠的影響力。

教育是許多事務進步的關鍵，有關動物福利的課程很多源自劍橋大學獸醫系，而在世界各地教授動物福利的師資，多半是由劍橋大學培育出來。過去 15 年來全球各地超過 260 名獸醫，參加劍橋大學的兩週動物福利訓練課程。Broom 及其同僚也曾赴 40 個國家演講，對象包括近期加入歐盟國家的政府官員。這些訓練有助於改變人們對動物的態度，同時也提昇世界多數地區對動物福利科學研究的注意。下列國家都因引入一系列的課程，大幅提高大學內有關動物福利的教學：墨西哥 (1988)，紐西蘭 (1990)，巴西 (1991)，馬來西亞 (1998)，以及中國 (2003)。

劍橋動物福利研究所造成的影響

以下所述為 Broom 教授及 CAWA 研究員之研究成果

➤ 動物福利評量方法

劍橋大學 CAWA 團隊，對於動物福利科學研究規範的發展，貢獻頗著。包括「福利」概念的釐清及定義，發展多種用來衡量動物福利的方法等。許多專題研究則是針對特定福利問題及動物能力，出版了許多書籍和論文，相關法律、標準及動物態度也因而改變。

牛隻（幼牛）

直到不久之前，歐盟境內生產的「小牛肉」（veal calves）還是將小牛關在狹小的隔欄，餵食缺乏鐵質及纖維的飼料，而其他小牛的飼養則是在社群孤立（social isolation）的環境，因無法攝取初乳，導致夭折率非常高。Broom 教授及其 CAWA 團隊自 1978 年起就已證明牛隻需要社群互動（social contact），充足的空間、均衡的養分，以及管理上的關鍵面向。這些要求目前在歐盟都已經是法律規定的義務。最近的研究則是針對牛隻閹割及除角時，麻醉與止痛藥劑的使用，以及疼痛程度的評估。

➤ 懷孕母豬

劍橋大學動物福利科學教授一職設立之初，歐盟大部分的懷孕母豬都是被繩索拴住或關在夾欄（sow stall）。Broom 及 Potter 在 1984 年的論文，是四篇類似論文之一，強調這種飼養方式造成豬隻在夾欄中咬欄杆（bar-biting），及不斷假咀嚼（sham-chewing）等刻板行為（stereotypies），顯示母豬夾欄違反動物福利。CAWA 團隊日後的研究指出，母豬夾欄造成豬隻反應遲鈍，及骨質脆弱等症狀，與 Broom, Mendl, Zanella 等人，對夾欄母豬動物福利嚴重不良的研究相呼應。刻板行為與反應遲鈍現象，與腦內啡肽（brain opioid）的改變有關，跟動物社群行為有關的研究，則顯示管理方式應該如何改善。歐盟已有部分國家禁止懷孕母豬拴繩，或以夾欄圈養，未來也將全部廢除。

➤ 蛋雞

歐盟絕大多數蛋雞以往是以格子籠（battery cages）方式飼養，現已禁止。CAWA 發表的論文中，許多是探討蛋雞在小於 450 平方公分/（每隻）的空間內，導致動物福利不良的因素為何。Knowles 及 Broom 在 1990 的研究顯示，母雞無法伸展其翅膀、雙腿，將導致骨骼脆弱，在被驅趕時容易斷裂。此研究影響後續的立法，保障雞隻飼養必須有足夠的活動空間，包括可以展翅。

➤ 運送

在 Broom 及 CAWA 之前的運輸動物福利研究，大部分只看最終結果，通常是計算動物運抵屠宰場時死亡的數量。CAWA 針對豬、羊、牛、馬、禽類在運送期間的各種情況，發表系列論文，包括裝卸載、承載密度、駕駛品質、旅程時間等都會導致動物福利受損。這些研究成果對立法，及相關準則的訂定都

有相當大的影響。而世界各國的研究團隊，不少科學家也是受過劍橋大學 CAWA 的訓練，並在許多其他領域，從事優秀的研究工作。

➤ 母豬分娩及其他豬隻福利

母豬分娩時通常會被「囚禁」。分娩欄 (farrowing crates) 內的母豬需求因此無法滿足，但仔豬的福利在其他畜牧管理系統，又顯得脆弱。Marchant, Bradshaw 和 Broom 等人，比較不同畜牧系統的研究，有助於探討如何兼顧母豬與仔豬的福利。這項與挪威和澳洲科學家合作的研究仍在持續中。Waran 和 Broom 針對小豬的研究則顯示，在圍欄中，將處於弱勢或受害的小豬 (victimised pigs) 加以區隔，可改善其動物福利。

➤ 肉雞、鴨隻動物福利，基因篩選對動物福利的影響

基因篩選影響了肉雞和其他農場動物的福利，生物科技也有類似問題，與這些主題有關的研究論文已經引起政府官員、畜牧業者和動物學家的注意。這個議題 10 年前很少人關心，現在已被廣泛討論。CAWA 針對白肉雞飛節灼傷 (hock burns) 引起雞隻腳部損傷或功能失常，以及消費者如何辨識的研究，最近也引起社會關注。還有一份關於如何改善鴨隻飼養動物福利實際改善方案的研究，最近也已經完成。

➤ 乳牛

三十年前，雖然有一些重大疾病，乳牛的動物福利大致還算良好。然而今日因為育種篩選高單位泌乳量牛隻的關係，導致更多普遍性的動物福利問題。CAWA 的系列論文探討乳牛跛腳和一般性動物福利，最近則針對基因篩選與動物福利的關連，得到許多科學家、政府及獸醫的重視。

➤ 魚類、實驗動物、野生及動物園動物

與魚類、實驗動物圈養，野生動物陷阱和獵殺，動物園野生動物圈養與管理等主題有關的動物福利研究論文，獲得廣大重視。魚的知能 (abilities) 和其動物福利相關的報告，引起公眾注意。由 Broom 教授和其他研究人員所做，針對魚類和無脊椎動物情識 (sentience) 與福利的評估，已在許多國家引發法律層面上的考量。Manser 針對實驗老鼠圈養的研究，促進了圈養系統的改良。CAWA 針對動物生理方面的分析，協助了動物學家 Bateson 和 Bradshaw 對被獵鹿隻動物福利的研究，也成了政府據以考量立法禁止帶狗狩獵的主要科學報告。

➤ 行為問題，犬、貓及馬的福利

犬、貓及馬的福利與行為問題，自 1987 年起，就已經是 CAWA 研究的主要議題。犬隻攻擊性的肇因已被闡明，同伴動物的行為失常問題，現在比較採取治療方式處理，而非予以撲殺。Hubrecht 的研究，促使犬舍設計的改良，因而提昇了狗的福利。基於 Rochlitz 一系列綜合研究報告的發表，我們現在知道貓在圈養情況下的需求為何，也瞭解如何減少貓在道路上的死亡率。關於馬在圈養環境的刻板行為和不正常行為的研究，也引起對馬廄內馬匹需求的注意。

➤ 重金屬對動物福利的影響

Clive Phillips 及其同僚，將草食性動物及其他包含人類在內的物種，所受的重金屬毒害程度予以量化，因而能對如何管控這些毒化物做成建議。

➤ 病原與重金屬對動物福利的影響

Broom 及其同事，針對牛結核病（bovine tuberculosis）和夏季乳房炎（summer mastitis）等之感染機制的研究，對於減少這些疾病的發生，已稍有幫助。以躲避病原為目的的行為，對於良好動物福利相當重要。CAWA 的一系列論文，探討諸如牛隻跛足（bovine lameness）和羊隻疥癬（sheep scab）病的影響程度，說明疾病是一個福利問題，並且有必要將動物的健康當作福利問題來考量。劍橋研究團隊扮演重要角色，以爭取一筆 450 萬歐元的經費給 8 所大學，共同研究動物福利指標，特別是牧場與疾病管理有關的疼痛和其他動物福利不良指標。

➤ 動物辨識（discrimination）、認知（recognition）與知覺（cognition）

針對家養動物嗅覺、視覺辨識能力的研究，有助於我們提供牠們的需求。當動物被認為具有複雜認知能力，證據也顯示牠們具有高度知覺，人類對牠們的尊重會提昇，殘酷的對待也會比較減少。Sommerville 等人的實務研究，顯示狗有能力追蹤並且找到人類。Elliker 等令人振奮的一項研究，則顯示狗有偵測人類疾病狀況的潛能。Hagen 和 Broom 關於社會互動與學習的研究，顯示動物具有知覺能力。研究顯示牛和羊會出現「靈光一閃」的「醞釀效應」（Eureka effect），代表當牠們學習到某些事物時，也會出現興奮的反應。

最近的一項研究，則呈現豬隻會運用從鏡子所獲取的資訊。這類研究引起公眾很大的興趣。Broom 的專書，《道德與宗教的演化》（“The Evolution of Morality and Religion”）就包括了對動物認知和能力的一般性探討。

➤ 動物態度，寵物對人類的影響

自 1986 年以來，CAWA 的許多研究，特別是 Serpell, Paul 和 Podberscek 等人，是探討影響人們對其他物種之「動物態度」的因素。這些研究釐清為何寵物和其他動物，會對人們如此重要。研究也顯示，在某些情況下，寵物之於人類健康，對有些人將是正面的影響。

➤ 劍橋大學動物福利科學資訊服務中心 CUAWIS

由 Broom 教授與當時的獸醫系主任 Caroline Manser 博士，接任的 Ana Pinto 博士及現任的 Irene Rochlitz 博士共同設立，中心是於 1994 年在英國女王訪問時正式揭牌成立。CUAWIS 提供專業訓練，及有關動物福利和「人與動物互動學」（Anthrozoology）的相關資訊。中心設有文獻資料庫，供應全球各地演講及課程需求，並可依照不同個人或組織需求提供報告。報告大約可分為特定議題的參考資料彙整，及資深科學家對文獻的詮釋和評論兩種。報告及課程都是由 CAWA 的研究團隊負責。

動物福利科學的歷史

資料來源：Donald M. Broom，2011. Springer Science + Business Media B.V. 2011

摘要

人類對動物的態度已經改變，「非人類」動物被廣泛視為「應受某種程度尊重」之道德主體。「人類」與「非人類」之間功能的比較已有數千年，但「人為管領動物也可感覺痛苦」，則是近年來才蔓延的想法。

過去 30 年來對動物「動機、認知及社會行為複雜性」之了解，促進了動物福利科學的迅速發展。早期嘗試將「福利」定義為「動物個體與自然的和諧關係」，然而第一個可以運用的定義，則是指「動物在因應環境時的感覺及健康狀態」。有些人認為福利僅僅指涉「感覺」，但因為感覺是進化衍生的機制，因此不能將感覺視為福利的全部。

目前有關福利的評估，大多先列舉包含動物特定行為表現在內的「需求」。探討何者對動物而言重要的精緻研究方法，取代了早期以自由為主的一般準則。許多福利的衡量指標都可顯示動物福利的好壞。「自然」(Naturalness) 雖不是福利的定義，但可說明為何某些需求仍然存在。近年來，因為大眾無法接受動物福利惡劣的飼養管理系統，「福利」已成為某種動物飼養系統是否得以永續的要件之一。而動物福利研究也成為重要政治決策的科學基礎。

Welfare

福利

資料來源：Broom, D.M. 2004. Welfare. In *Bovine Medicine: Diseases and Husbandry of Cattle* (2nd Edn), ed. A.H. Andrews, R.W. Blowey, H. Boyd and R.G. Eddy 955-967, Oxford: Blackwell .

摘要

社會大眾對乳牛與肉牛產業的觀念

當一般大眾被問及他們對乳牛與肉牛產業的想法，大多是想到牛群在草原上吃草，乳牛在生產奶製品期間可孕育數胎小牛。對大眾而言，乳品及牛肉也連結到人類營養及健康、對環境的影響及動物福利等面向。如果這些生產面向，被聯想到任何壞的印象時，就會連帶影響到其銷售量。例如狂牛病（BSE）就曾在短期內重創牛肉市場。有些人則因膽固醇的考量而減少對奶製品的消費，有些則關注牛隻排泄物產生甲烷（沼氣）會造成環境污染。此篇論文則從動物福利的角度來探討這個議題。

直到最近幾年，對乳牛福利負面的評論並不常見，而僅是批判小牛肉（Veal Calf）的生產方式。然而酪農業也在改變中，一些有關乳牛福利的證據愈來愈多，在某些國家內已形成大眾輿論壓力。對乳牛產業而言，在社會廣泛對繁殖和管理方式加以譴責之前，應該對福利議題審慎以對。同樣地，肉牛的生產也尚未因福利問題而備受質疑，然而一些較具批判性的媒體文章或電視節目的論據相當堅實，可能對相關產業鏈（生產、製造及行銷）造成殺傷力。

大眾對動物福利的關切明確表現在產品的購買上，也對經銷商及民意代表構成壓力。消費者的壓力可影響主要的超市及食品連鎖店，連帶也可促使供應商改變。因為經銷商無法承擔消費者批評的壓力，可對供應商要求符合福利標準，並檢驗是否有被實際遵守（Broom, 1999）。在一些歐盟國家內，因為採購公司要求供應商需符合規定的飼養環境及方式，也使得這些供應商著手改變。許多農場都停止使用關禁小牛的柵欄，狹小的母豬夾欄與拴繩，也不再對 100 公斤以下上市的肉豬實施閹割手術。

社會壓力對立法的效果則較緩慢，但法令可對所有製造商都有同等規範的效力。法律規範已經愈來愈國際化，但顯然重要的是，應該基於整體的道德立場，例如為了防止動物福利不良，同樣的限制也應適用於從倫理標準較低國家進口的產品，且需獲得世界貿易組織（WTO）的授權。

Animal Welfare In Education And Research Animal Welfare: An Aspect of Care, Sustainability, And Food Quality Required By The Public

動物福利：照護、永續及食物品質

資料來源：Broom, D.M. 2001. Assessing the welfare of hens and broilers. Proc. Aust. Poult. Sci. Sym., 13, 61-70.

摘要

人們對被使用的動物覺得有某種義務，也展現出某種程度的關注行為，同時，動物福利也是我們決定動物使用系統是否永續的面向。一個動物福利惡劣的動物飼養系統因為無法被大眾接受，將無法永續。

現今動物產品的品質判斷，已納入倫理層次的考量，包括如動物福利的外在呈現，及對消費者的影響結果。因為崇尚高生產力的基因選種及管理，可能導致更多疾病及其他惡劣的福利，因此消費者要求動物產品生產機制應該進行重大改變。

在講授動物福利時，一個能與需求、健康及緊迫等概念連結的定義，有其需要。動物福利的科學評估方法，近年來也長足發展，成為一門主要學科。

獸醫學位課程，應包括整套動物福利科學，及其道德與法律相關面向的訓練。每個國家都應設立一個全國動物福利科學諮詢委員會，由獨立的科學家組成，包括有能力撰寫公正科學知識評論的獸醫。

Welfare Assessment and Relevant Ethical Decisions: Key Concepts

福利評估及相關的道德決定：關鍵概念

資料來源：Broom, D.M. 2001. *Welfare Assessment and Relevant Ethical Decisions: Key Concepts*. *ARBS Annu Rev Biomed Sci* 2008;10:T79-T90.

摘要

動物福利正迅速擴展成為全球各國關切的議題，同時也改變了動物被飼養及對待的方式。每一動物的福利，與其對環境的適應狀態息息相關，包括對疾病的反應、各種行為及生理反應，及腦功能。福利包括個體是否健康，及對正負向感受的程度。

所謂福利即是與自然融合的說法無法，應用在福利評估上，同時強調動物福利包括其在自然環境下會呈現的狀態也是不正確的。將這個福利的定義視為具有功能性，是一種誤導，其實「感覺」是動物的部分功能，與動物的痛苦或感覺相關的定義，才是具有功能性的定義。

對福利的評估，應該將各種適應行為系統及策略納入考量，測量範圍需包括行為、生理、腦功能、免疫系統功能、損害，偏好的強度等。評估動物能力或需求的架構，應納入其對環境適應難易程度的討論。

動物福利的道德決定一般都涉及義務論的面向，即明白指出不應做的行為，以及兼具成本效益平衡的結果論面向，而這些倫理取向皆各有其優劣得失。

Quality of life means welfare: how is it related to other concepts and assessed?

生活／生命品質就是福利： 如何連結到其他概念，如何評估

資料來源：Broom, D.M. 2001. Assessing the welfare of hens and broilers. Proc. Aust. Poult. Sci. Sym., 13, 61-70.

摘要

我們對自身的道德行為應適用於何種個體的看法，正逐漸擴展到更多人群及物種。動物福利正迅速擴展成為全球各國關切的議題，同時也改變了動物被飼養及對待的方式。對於是否可以宰殺動物的道德問題，應有別於動物福利的程度及接受度。“安樂死”這個詞的用法，應以基於動物個體本身的利益而殺死該動物為限。生活品質（Quality of Life, QoL）對人類而言，大多包括生理狀況，及因傷害與疾病造成的缺陷，功能表現、對功能的想像、及因本身所信功能程度的滿意度。如果福利是指「個體為因應其環境所付努力的狀態」，那麼福利在實質上也等同生活品質。兩者都包含個體的「因應系統」（coping system），包括對疾病的反應、各種行為及生理反應，及對痛苦及快樂的認知過程。因此，福利及 QoL（生活品質）都包括個體是否健康，及對正負向感受的程度。許多關於動物福利的研究，都包含客觀數據，而關於生活品質的論文，則較少提及。一些關於人類生活品質的研究，其對受訪者的提問，則是基於客觀性不足的方法。

生活品質或福利的評估都不應該只採取主觀的衡量方式。對福利的評估，應該將各種行為適應系統及策略納入考量，測量範圍包括行為、生理、腦功能、免疫系統功能、甚至造成的損害等。評估動物能力的架構，應納入其對環境適應難易程度的討論。一般具有較高認知功能的動物，大多有較佳的適應能力。本文探討福利的長期評估，能幫助我們在動物福利狀況「良好」，或是「難以接受的惡劣」之間，做出道德抉擇。

生物工程對資源分配及福利的影響

資料來源：Broom, D.M. 2001. Assessing the welfare of hens and broilers. *Proc. Aust. Poult. Sci. Sym.*, 13, 61-70.

摘要

包括人類在內的所有動物，都具有因應多種實際及潛逆境的功能（Lazarus and Folkman, 1984; Broom, 2001a），為此他們發展出諸如免疫系統、腦功能及外顯行為上的器官生理、細胞機理上的應變機制（Broom and Johnson, 2000）。部分腦部機制主管正面及負面感覺的認知及情緒。痛苦、恐懼及各種愉悅感受，是適應系統中重要的一部分。因此，如同其他生物機制，這些感覺系統也因天擇而演化，以便適應環境（Broom, 1998）。各種不同機制可幫助動物成功適應其環境（Broom, 2006），而適應上的難易程度，關係到該動物個體的福利（Broom and Fraser, 2007）。動物福利與其適應環境的嘗試行為息息相關（Broom, 1986）。

動物福利的評估可從最好到最差，當動物需求得到滿足時（Hughes and Duncan, 1988a,b; Dawkins, 1990; Toates and Jensen, 1991），或常處於正面的情緒感受下，就是很好的動物福利；而當其需求無法被滿足或出現受傷、適應困難或痛苦跡象時，就是很差的動物福利。

本研究探討生物工程—特別是「基因工程」對動物福利的影響。一個可能造成其福利變差的原因，是有些動物在經過基因改造後，某些部位的功能過度使用，造成其他功能的受損或不足。資源可用性、基因改變，及福利之間可能的連結，是本文重點。接下來會討論基因改造對動物福利的影響，有些改變牽涉到資源可用性的限制，有些則無。這些限制可能對動物福利有重要影響的討論，則留待各種實例的探討後再提出。

動物福利及立法

資料來源：Broom, D.M. 2001. Assessing the welfare of hens and broilers. Proc. Aust. Poult. Sci. Sym., 13, 61-70.

摘要

近 25 年來動物福利已普遍被接受為一門科學學科。我們對動物的功能性，包括牠們具有情識知覺的了解也相對增加。其影響之一，是社會大眾開始要求立法以保護動物。雖然已有愈來愈多國家通過相關立法，但仍有許多國家在保護動物福利的法令上仍明顯不足。改善動物福利的長期策略之一，是透過充分教育及訓練，讓使用或對動物有責任的人們，瞭解動物的生理功能，包括什麼會改善或損害動物的福利。

雖然法律及標準的設立仍有需要，廠商的經銷準則已對農場動物的福利產生重要的影響。更多關於動物福利的科學研究必須進行。制定更好的執法方式，及提供充分的人力，都非常重要。

雖然許多文獻都提出影響動物健康及福利的不同要件，謹慎的分析也必須涵蓋風險及效益。民意代表不僅是風險管理者，更須在立法的每個面相都考量到風險與效益的平衡。

Cognitive ability and awareness in domestic animals and decisions about obligations to animals

馴養動物的認知能力與覺察，及對動物的義務

資料來源: Donald M. Broom, CAWA, University of Cambridge, UK

摘要

對動物行為，特別是社會行為的觀察，及對學習與腦部功能的實驗研究，讓我們瞭解到動物具有複雜概念認知能力。

馴養動物為了學習得到某種資源或完成某一行動，會將人類的語言與犒賞連結，做出導航或迂迴繞道等連續性的動作，忽略其他個體，重複其他個體的動作，分辨出誰有或沒有資訊，或透過某種溝通而使人類或其他動物完成動作。有些習慣人類，但並非家養的野生鸚鵡能使用某些特定意義的字，有些個案則顯示動物對刺激、個體或動作的記憶，可持續幾天、幾週或幾年。未來可能發生的事，可被預測，一段期間內會有的改變，應予考量。

動物需求的科學證據，一部分是對動物產生動機強度的方式及其相關認知能力的研究，動物認知及學習可能與其生理、行為及正負面感覺的改變有關。學習及其他複雜行為可影響動物的「情感」(affect)，其情感又會改變認知。動物會有認知偏見 (cognitive bias)，似乎是動物情感與福利的指標，但必須在其他資訊的輔助下詮釋。

上述研究，提供了動物具有情識 (sentience) 和一定程度覺察能力 (awareness) 的證明。「情識」一詞，涵蓋廣泛的能力，而不僅只是一部份感覺能力 (feeling)。拒絕承認非人類動物也有複雜能力和感覺的科學家，延宕了這個學科的發展。

大部分的人都覺得他們對某些動物有某種義務，然而他們願意保護動物，可能是因為他們覺得動物具有內在價值，或是因為他們對動物福利的關注。對於社會性的動物，天擇促進某種道德體制，包括避免傷害他人、合作及利他的種種行為。

對相關行為的評估結果，可提供作為是否應保護某種動物之考量。其他考量要件還包括：動物是否知覺自己為一「生命個體」(as an individual)、跟人類似、覺察能力的程度、感覺的程度，身大 (being large)，稀有 (being rare)，有用或跟人類一樣也會有「美美的」特質。在設計圈養動物生活環境的豐富性時，動物的認知覺察能力，應予考量。

Effect of caustic paste disbudding, using local anaesthesia with and without analgesia, on behaviour and cortisol of calves

「燒鹼」去角法在小牛行為和皮質醇濃度上的 效應：局部麻醉、使用及不使用鎮痛劑

資料來源：George Stilwell a,* , Rita Campos de Carvalho b, Miguel S. Lima a, Donald M. Broom

摘要

以燒鹼法 (caustic paste) 為 1 月齡小牛去角，我們檢視局部麻醉，使用與不使用非類固醇抗發炎 (non-steroidal-antiinflammatory) 鎮痛劑 (flunixin-meglumine)，對行為與血漿皮質醇的影響。檢視時間：去角後 15 分鐘，1，3，6 及 24 小時 (實驗 1，n=32)；10，30 和 50 分鐘 (實驗 2，n=35)，以及在麻醉劑消退後，約 90 至 180 分鐘 (實驗 3，n=16)。在實驗 1，小牛去角後 1 小時的皮質醇濃度高於所有其他組。使用與不使用局部麻醉，都在去角 1 小時後，皮質醇均高於基準線。在第 15 分鐘，無麻醉、無止痛去角小牛疼痛相關行為的出現率高於所有其他組。使用麻醉，或使用麻醉加鎮痛的小牛，比控制組出現更多疼痛相關行為。在第 1 和 3 小時，無麻醉或局部麻醉去角小牛，比控制組和鎮痛劑組呈現更多疼痛相關行為。在實驗 2，無麻醉去角小牛在 30 和 50 分鐘時，皮質醇高於其他所有組。就皮質醇本身而言，在麻醉組、麻醉加鎮痛及「假去角」組 (sham-disbudded) 之間沒有分別。疼痛關連行為的出現率，在無麻醉去角組，遠高於其他任何組。麻醉組，或麻醉加鎮痛組的疼痛相關行為出現率，在手術後第 10 分鐘內，遠高於「假去角」組。實驗 3，相對於控制組，無麻醉去角小牛在第 90 分鐘出現較高的皮質醇，僅麻醉無鎮痛組，在第 180 分鐘有較高的皮質醇。與「假去角」組比較，無麻醉組去角小牛在第 90，120 和 150 分鐘出現較多的疼痛相關行為，僅麻醉組，則出現在第 180 分鐘。在實驗 1 和 3，有幾隻去角小牛出現「呆滯平躺」(inert-lying) 的姿勢，這種狀態也許會導致其他較動態行為的出現減少。

證據顯示，以燒鹼法去角造成動物至少 3 小時的壓力，局部麻醉只能在第 1 小時控制疼痛，但在神經阻斷作用消退後，不舒服的感覺又會出現。整體而言，只有局部麻醉加上 NSAD 鎮痛，可以有效減少疼痛。「呆滯平躺」行為是小牛去角手術後，出現壓力的一個表徵。

The Welfare of Livestock During Road Transport

陸路運輸期間的動物福利

資料來源：Broom, D.M. 2001. Assessing the welfare of hens and broilers. Proc. Aust. Poult. Sci. Sym., 13, 61-70.

摘要

評估運輸期間的動物福利，應包含行為、生理及屠體品質等衡量指標。同時，健康狀況也是福利的重要部分，任何因運輸而加重，或造成的疾病、傷害或死亡都應納入考量。許多指標是有關緊迫的衡量，其中包括動物個體長期不適的效應。本文討論部分影響驅趕、裝卸，及運輸期間動物福利的關鍵因素，包括：動物態度（attitudes to animals）、員工訓練、員工給付方式、法律及廠商的規範、崇尚高生產力的基因選種、飼養狀態及經驗、不同群體動物的混養、驅趕方式與過程、駕駛習慣、載運密度、旅程長短、疾病的感染和散播等。

為了確保良好運輸動物福利，所有參與運輸的人都應該被充分告知有關動物的資訊，以及如何評估動物福利。應有謹慎地運輸計畫，選擇適當的交通工具，應提供大多數種類動物足以躺下的空間。如果是馬、牛或羊，短程運輸應有站立的空間，運輸距離過長則應有讓動物攝取食物及飲水的活動空間。交通工具的設計及空間，應能讓人對每隻動物進行充份的檢查，否則應儘量縮短運輸時間。

所謂「長途」對不同種類的動物有不同的意涵，但無論如何均應儘量避免，如若必須長途運輸則應提供良好的條件和照料。運載動物的駕駛應更為小心，避免突然轉彎或煞車，通風及其他避免肢體傷害的設施都非常重要。應管理動物運輸，以降低動物的疾病感染性及其散播。

不同欄舍母豬動物福利比較

資料來源：D. M. Broom, M. T. Mendl and A. J. Zanella

摘要

12 隻母豬在品質良好、沒有墊料的夾欄，另每 5 隻一群、總計 3 群的母豬在鋪有稻草墊料、具有個別食槽的欄舍，又另 38 隻母豬聚集在一個鋪草、具有自動餵食器的院子，分別都以前四胎懷孕期比較。這些母豬都來自同一源頭，大約是 9 個月大，實驗從牠們首次懷孕的第 7 週開始，都安置於同一建築物相鄰的房間，由同一群員工照護，每天提供每頭豬 2.2 公斤一樣的飼料，研究期間不加入任何新的動物，每胎分娩及哺育（service accommodation）後，回到原來的欄舍環境。用寬廣的福利指標來衡量，可清楚顯示關在「夾欄（Stall）」的母豬，較群居母豬呈現更多問題，這些問題到懷孕第四胎時比第一胎更為嚴重。

到第四胎懷孕時，關在夾欄的母豬，只有約 0.14 的時間還有活動性，明顯呈現刻板行為，且有 0.5 的時間，部分呈現刻板的「假喝水」（drinking）、「假拱土」（rooting），或是咀嚼欄杆（chewing at pen fittings）。相較之下，群居母豬的類似狀況就少很多（約 0.037-0.081）。到第四胎懷孕期時，關在夾欄的母豬也比群居母豬更具侵略性，體重也較輕。

無論就生理、免疫檢測、或繁殖成果比較而言，都沒有差異。比較兩種群飼系統，母豬第一次懷孕時，使用自動餵食系統的母豬較容易打架，特別是在剛開始混群時（initial mixing），但具有敵意的互動，整體而言，比每群五隻的母豬少。嘴部的刻板行為在小群組，比大群組稍微多一些，可能是因為居住空間較小的關係。但明顯少於關在夾欄的母豬。到第四胎懷孕期時，小群或大群的豬隻都沒有太大差異，大多已適應環境。不同欄舍系統的福利評估，需要應用寬廣的衡量指標及長期的研究。

Assessing the welfare of hens and broilers

蛋雞與肉雞的動物福利評估

資料來源：Broom, D.M. 2001. Assessing the welfare of hens and broilers. Proc. Aust. Poult. Sci. Sym., 13, 61-70.

摘要

「福利」是包括人類在內的動物所獨享的用詞，雖然對許多人有其特殊的重要性，但仍須課以嚴謹的定義，才能發揮有效且一致的功能。在精確的科學衡量中，在具有法律效力的文件中，或在公開的聲明及討論中，「福利」概念的清晰定義，有其需要。要在不同情境下比較動物福利，或在特殊情況下加以評估，都必須以客觀的方式進行。福利的評估必須與道德判斷區隔，然而一旦評估完成，其所提供的相關資訊，應可用於決定特定情境下的倫理判準。

在討論動物福利的定義時，一項基本要件是必須回歸到動物個體自身的特性，而不是看人類給予動物哪些東西。雖然個體動物的福利，可能會因為人類給予的東西而大有改善，但「東西」本身並不是「福利」。譬如「提供金錢給窮人」這種鬆散的福利概念，在科學上或法律上都沒什麼意義，然而如果確切指出這個貧困的人運用金錢而得到溫飽，就是其福利的改善。福利除了適用於人類，同時也適用於野生、農場、動物園、實驗室或人們家中飼養的動物。福利的範疇包含疾病、傷害、飢餓、有益的刺激、社交互動、居住狀況、疾病照護、人類對待的方式、搬運、實驗流程、各種手術操作、動物治療，以及因為一般性的育種，或基因工程對基因的改變等。

我們必須對「福利」提出清楚的定義，以便相融於其他諸如需求、自由、快樂、適應、控制、可預期性、感覺、痛苦、疼痛、焦慮、恐懼、無聊、壓力、及健康等既有概念。

Report on “Pigs of God”

台灣「神豬」動物福利評估

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助理：Sophie Prowse

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問題意識

本評估所根據的影片，是關於台灣每年都有的「神豬」競賽活動。參賽神豬飼養達兩年以上，重達600公斤，甚至偶而達900公斤。神豬被當眾宰殺，屠體彩飾後遊街示眾。說明影片所示飼養、運移、屠宰過程對豬的動物福利有何影響，乃本評估之主旨。

前言

關於豬隻福利的科學研究近年來發展快速(Broom & Fraser, 2007；Faucitano, 2008)。所謂動物福利，是指動物個體「提付心力以因應環境」(attempts to cope with its environment)的狀態(state)，而福利(welfare)包含健康、感覺，以及避免緊迫(Broom & Johnson, 2000)。歐盟食品安全管理局(EFSA)動物健康與福利科學委員會2005至2007年間，已有五篇詳盡報告。

這些報告強調，在設計飼養豬隻的系統時，應將動物的需求納入考慮。

EFSA於2004年另有一份報告，「致昏及屠宰方法的動物福利問題」(Welfare aspects of animal stunning and killing methods)，詳細說明了豬隻的人道屠宰，以及如果缺乏有效致昏，將導致動物痛苦和其他不良動物福利的結果。

豬是活動力很強的動物，如果環境適當，甚至即使已有充足的食物，仍用大半天時間覓食、挑食、探索環境並相互社交互動。

有關偏好強度的幾項實驗發現，豬隻強烈偏好同伴之間的社交互動、拱土，以及撥弄稻草或是類似物質(van Rooijen 1982, Stolba & Wood-Gush 1989, Hutson & Haskell 1990, Arey 1992, Matthews & Ladewig 1994)。並證明牠們很討厭被禁錮(Barnett et al 1984, Broom et al 1995)。飼養在夾欄的母豬由於缺乏運動，造成部分肌肉的肌量(mass)減少及骨骼強度的不足。(Marchant & Broom 1996；見附錄一)

豬隻行為的複雜度，操控其行為的腦部機制，已獲廣泛科學研究證實。豬的學習能力相當強，其社交行為也細膩複雜。以致於一旦牠們無法管控周遭環境事物，或是沮喪挫折，或處於無法預知的狀態，就會有動物福利問題。

豬的痛覺系統跟人類似，會因為病變、淤傷或身體局部受壓等等，而感到疼痛。

豬舍和管理

飼養豬的欄舍應能讓正常豬隻舒適躺下或轉身，但沒有提供豬所需要、可和躺臥區域有所區隔的大小便區。[【顯示不好的動物福利】](#)

影片中神豬的體積實在是大到無法自行翻身或轉身。牠們的身軀如此龐大，可以推斷影片拍攝之前數週、甚至於數個月，牠們已經沒有辦法站立了。這從牠們的生活情景，特別是要被拖去宰殺時，可明顯證知。龐大身軀已使動物無法控制自己的行動，及與周遭環境互動。[【顯示不好的動物福利】](#)

豬的超級重量，也會造成嚴重不舒服。由於牠們難以輕易移動，將很容易造成瘀腫和傷害。[【顯示不好的動物福利】](#)

影片沒有顯示直接證據，但豬的內臟器官也可能因為超重而受到損傷。這樣的損傷，有時會出現疼痛，有時不會，但無論如何，動物福利都不好。

以正常方式飼養的豬隻，可以自己選擇何時想吃、想喝水，但神豬是被強迫進食的，牠們被以管子塞進嘴裡強灌濕軟的飼料。過程中，這些神豬雖然有吞食，但有些動作的出現，顯示了牠們對被灌食的厭惡。如果有所選擇，沒有豬會吃下那麼多的食物。[【顯示不好的動物福利】](#)

沒有被灌食的時候，神豬的身旁沒有提供飲水，這會造成牠們某種程度上的脫水，且因身軀龐大，也非常容易造成體溫過高、過熱。[【顯示不好的動物福利】](#)

體溫過高的問題，會因為牠們無法站立以便散熱，或移到散熱較佳的地方，而更加嚴重。

無法站立的問題，會讓神豬在需要大小便時，變得更为嚴重。因為無法自行站立走動，也容易導致泌尿功能失調。[【顯示不好的動物福利】](#)

神豬被飼養在貧瘠無聊的欄舍，沒有稻草或其他物質當墊料，牠們用鼻子探索、翻拱、操弄物料的重要需求，無法被滿足。[【顯示不好的動物福利】](#)

屠前驅趕或移動

因為神豬無法自行站立，牠們是被繩子套在後半身拖著移動。繩子深深地坎進豬的身體，將造成相當的疼痛。被一路拖著走，也會造成神豬的驚嚇，以及皮膚的擦傷。[【顯示不好的動物福利】](#)

屠宰方式

影片顯示神豬被當街宰殺，充滿不安與騷動，許多人在近距離圍觀。豬被翻躺朝上，尖刀刺入喉嚨，切斷牠的主動脈，讓牠流血到死。沒有使用任何方法讓豬先昏厥。宰殺神豬前的種種過程，造成動物福利不良，又沒有採取先讓豬昏厥再宰殺的人道方式，讓神豬被迫清楚感受喉嚨刺入刀刃時無比的疼痛。[【顯示不好的動物福利】](#)

神豬喉嚨被尖刀深深刺入時，影片顯示為第 2 分 11 秒，經過短暫時間，於第 2 分 30 秒至 2 分 45 秒時，神豬出現一連串狂亂的掙扎反應，傷口開始大量噴血。第 2 分 56 秒時，神豬對於傷口的觸動還

有反應。這表示長達 45 秒的時間，神豬是在極度的痛苦當中。其後分別於第 2 分 57 秒，3 分 01 秒、3 分 06 秒、3 分 12 秒、3 分 17 秒、3 分 22 秒、3 分 33 秒、3 分 40 秒，以及 3 分 44 秒，神豬嘴巴的動作顯示牠還在呼吸，但可能在部分時點失去知覺。在第 3 分 44 秒之後，神豬再也沒有呼吸的反應。由此可推算神豬可以感受痛苦的時間，長達 45 秒至 93 秒。【顯示不好的動物福利】

據了解，屠宰時未先將動物有效致昏，或對農場動物強迫灌食，在台灣均屬違法。

【附錄一】飼養環境對乾母豬（dry sow）肌肉重量與骨骼強度的影響（摘要）

家禽籠飼會影響其骨骼強度曾被證實，但此一缺點對其它同樣被圈養於狹小空間內動物的影響，一直未被驗證。本研究的主要目的，是比較同齡、近似的未懷孕母豬，分別被圈養於兩種不同環境，經過 8、9 個懷孕週期後，比較其肌肉重量及骨骼強度的不同。兩種母豬圈養系統分別為：(1) 單飼的夾欄 (2) 群飼的圍欄。

豬隻宰殺後，切下左前肢骨（thoracic limbs）、後肢骨（pelvic limbs），及 14 塊運動肌肉，分別秤重。肌肉重量比，則是以單一肌肉重（g）除以豬隻總重（kg）計算，數據有明顯差異。夾欄單飼母豬不僅肌肉純重比較輕，重量比也比圍欄群飼母豬低。

左肱骨（humerus）和股骨（femur）也分別切下，使用 Instron Universal Tester 測試機，以三點彎曲測試法（three-point bend test）測試。結果顯示，夾欄單飼母豬骨骼強度約為群飼母豬的三分之二。表示圈養在夾欄的母豬，由於缺乏活動空間，造成肌肉重量減少，以及骨骼強度的明顯落差。

資料來源：

Effects of dry sow housing conditions on muscle weight and bone strength (1996)

Animal Science 1996, 62:105-113

British Society of animal science

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Report on “Pigs of God”

This report was compiled by Professor D.M.Broom with the assistance of Mrs Sophie Prowse and is based on video material provided by WSPA and originating in Taiwan.

13th February 2008

The questions posed

The video information refers to an annual activity in Taiwan, known as “Pigs of God”, in which pigs that have been reared for up to two years, reaching weights of up to 600 kg, or occasionally 900 kg., are killed in public and their carcasses paraded around the streets. A report was requested about the effects on pig welfare of the procedures evident from the videos.

Introduction

Scientific studies of the welfare of pigs have developed rapidly in recent years (Broom and Fraser 2007, Faucitano 2008). The welfare of an animal is its state as regards its attempts to cope with its environment and welfare includes health and feelings as well as the avoidance of stress (Broom and Johnson 2000). Comprehensive reviews of the subject are provided in five Reports of the European Food Safety Authority (EFSA) Scientific Panel on Animal Health and Welfare (2005-7). These detailed reports emphasise that the needs of the animals must be taken into account when designing systems for keeping pigs. A further EFSA Report on “Welfare aspects of animal stunning and killing methods” (2004) gives details of how pigs can be killed in a humane way and of the pain and other poor welfare that is a consequence if effective stunning is not carried out.

Pigs are active animals, when provided with an adequate environment, and even if provided with sufficient food, spend much of the day foraging, selecting food items, investigating their environment and interacting socially. In experimental studies of strengths of preference, pigs show strong preferences for social companions, rooting in earth and manipulating straw or similar materials (van Rooijen 1982, Stolba and Wood-Gush 1989, Hutson and Haskell 1990, Arey 1992, Matthews and Ladewig 1994). They find close confinement aversive (Barnett et al 1984, Broom et al 1995). Lack of exercise in stall-housed sows results in reduced mass in some muscles and reduced bone strength (Marchant and Broom 1996).

The complexity of pig behaviour, and the brain mechanisms which control it, is evident from a wide range of studies. The learning ability of pigs is considerable and their social behaviour elaborate. As a consequence, welfare problems arise for pigs if they are unable to control events in their environment, if they are frustrated, or if they are subjected to unpredictable situations. Pigs have a similar pain system to that of humans and are caused pain by lesions, bruises, pressure on localised body areas, etc.

Housing and management of the pigs

The pigs are kept in pens that would allow a normal pig to adopt comfortable lying positions and to turn around. The pens would not provide the separate lying and dunging areas that pigs need. (Indication of poor welfare)

The pigs shown in the video are so large that they would have difficulty in turning around. Their body size is such that, at the time shown in the videos and probably for some weeks or months before this, they cannot stand. This is evident in the living conditions and, in particular, at the time that the animals are being moved for slaughter. The body size would prevent the animal from being able to control its own behaviour and its interactions with its environment (Indication of poor welfare). This great body weight would cause severe

discomfort to the pig. As they are not able to move easily, they would be likely to develop sores and injuries. (Indication of poor welfare) It is also possible that internal organs would be damaged by the great weight of the animal but there is no direct evidence for this. Were such damage to occur, for some damage there would be no pain but for other damage there could be pain. In either case, welfare would be poor.

Normal pigs are able to select the times when they eat and drink. These pigs are force-fed with a wet feed squirted into the mouth of the pig. During the force-feeding procedure, the pig swallows the food but some movements are made that indicate that the force-feeding is aversive. No pig would eat so much food given the choice. (Indication of poor welfare) The pigs appear to have no water at times when they are not being fed so could be subject to some degree of dehydration and, because of their great body size, they would be very susceptible to over-heating. (Indication of poor welfare) The risk of over-heating is made worse by the inability of the animal to stand and cool themselves or to move to a place where cooling is more efficient.

The inability to stand would cause great problems to the pigs when they needed to urinate and defecate. Inability to stand is likely to lead to urinary tract disorders. (Indication of poor welfare)

The pigs are kept in barren pens with no straw or other stimulation. Hence an important need of pigs to root with the nose and manipulate material such as straw is not met in these conditions. (Indication of poor welfare)

Movement of pigs to place of slaughter

As the pigs cannot stand, they are dragged by ropes put around the hind-quarters. This rope digs into the flesh of the pig in a way that must cause pain. The action of pulling the pig along the road would be disturbing to the pig and would be likely to cause skin abrasions. (Indication of poor welfare)

Method of killing the pigs

At least one pig is killed in the street with much disturbance and many people in close proximity. The pig is rolled onto its back and a knife is inserted into its throat area, cutting major blood vessels so that it bleeds to death. No stunning procedure is used. The handling procedure would cause poor welfare and the absence of stunning would result in the pig feeling all of the pain and distress associated with the cutting of the throat. (Indication of poor welfare)

After the sticking procedure, when the knife is inserted into the thorax of the pig, at a time shown as 2 minutes 11 seconds on the video, there is a short delay before the pig shows a series of violent struggling responses between 2 min 30 and 2 min 45. Blood is pouring from the cut. There appears to be a reaction to a touch on the cut skin at 2 min 56. During this time of 45 seconds the pig would have been in extreme pain. After this time, mouth movements indicating breathing are shown at 2.57, 3.01, 3.06, 3.12, 3.17, 3.22, 3.33, 3.40 and 3.44. During this time, it is possible that the animal was sensible to pain but at some point it would have become unconscious. After 3.44, no further movements are seen. Hence the period when the pig would have been sensible to pain would have been between 45 and 93 seconds. (Indication of poor welfare)

I understand that killing without prior stunning is contrary to the law in Taiwan. I also understand that force-feeding of farm animals is not permitted under the law in Taiwan.

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「動物福利與現代獸醫發展」國際研討會

會前提問

1. 是否該強迫飼養寵物者接受生命教育？
2. 是否該給與繁殖寵物者更多責任？
3. 動物最大的福利就是不被人類任意宰殺，有何方法可以有效阻止人類這種蓄意謀殺的行為？不管是為了經濟利益，或只是為了裹腹。
4. 動物被迫施以安樂死與動物福利是相互矛盾的，大多數國家安樂死是違法的，但卻可以進行動物安樂死，這是多麼矛盾且沒有愛與自私的行為，有何方法可以在世界各國全面禁止安樂死？
5. 集體農場廢除的可能性？
6. 正視傳統醫療（中醫）對動物疾病與重大傷害救治的貢獻，或現代獸醫與中醫結合醫療的可能性。
7. 有蛋雞平飼與籠飼動物福利之比較？
8. 提升動物福利，勢必提升養殖成本。如何處理動物福利與經濟利益的相衝突？
9. 動物實驗非常殘忍，但若沒有動物實驗，很可能許多醫治疾病的藥物都不能成功研發。如何處理道德倫理和人類利益的相互衝突？
10. 工廠化農場(factory farming)對動物和消費者之關係轉化的影響。因為有工廠化農場和屠宰廠的代勞，消費者愈容易買到肉製品，卻對其生產過程和源頭愈難了解？
11. What do you think about feeding stray animal ? Right or wrong ?
12. How to manage “no-kill shelter” and their perpetual operations ?
13. What are characters of veterinary medicine student in animal welfare ?

14. 在疫病控制的短期間，上萬隻動物於飼養場所就地撲殺。如何兼顧疫情控制的緊急措施，以及人道屠宰的基本原則？

曾請教過應邀來台擔任講師的 RSPCA 資深動物保護檢查員，其認為疫病狀況視為特殊，現場作業若不能配合，仍以防疫原則處理為重。

不過現代經濟動物飼養規模日益趨大，以及國際疫病交流的趨勢，大量撲殺的防疫措施，已經不能算是“偶發”性；是否有更精緻的處理方式，或是其他取代全面撲殺的科學手段來控制疫情？倉皇粗糙的就地屠宰，產生的大量動物屍體及廢棄物，恐怕在公共衛生造成的後遺症更多！

15. 請問動物對於「情緒和疼痛」的感覺和人類一樣嗎？

16. 除了食用以外，有哪些是我們日常生活中不經意但卻侵犯動物福利的行為？

17. 除了環境多樣化外，人類還可以提供什麼給圈養動物及動物園動物？

18. 動物福利應為一全球議題或是地區議題？在不同國情、社會風俗民情下，對待動物好壞的標準似乎也不同。似乎放到經濟層面（如畜產、娛樂經濟）的場合，比較有機會將動物福利視為某一層面的標準，作為比較和考量。想瞭解所謂「動物福利科學」及其是否將世界各地多元「人與動物」社會歷史，在研究時作為某些層面或階段的考量？

19. What do you think about“Live feeding” for captive wildlife- in terms of Animal welfare & Animal Right perspective ?

20. What are effective treatments for“Self Injury Behavior”(SIB) animals?

註：協辦單位在不違原意的原則下，增刪部分文字，以利流暢。歡迎於現場討論時，補充或修正。

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