

The final part of this book deals with farming and food policies for a sustainable future. S Wirsenius and F Hedenus discuss greenhouse gas emissions and a rational outcome would be to have policies which increase broiler production, as poultry meat produces less GHG than other meats. T Land, M Wu and M Caraher accept the complexity of life and conclude that meat and milk production and consumption is only one part of a much wider discussion on how we humans are destroying earth through greed. This chapter identifies the global crisis as being due to more than meat consumption and is a welcome change from the narrow views expressed in many of the other offerings. J Perritt ends by arguing that 'wretched' WTO rules do not allow the UK to become some sort of Nirvana and argues at the same time for government to make people behave rationally and eat a limited amount of meat.

This is an interesting book but it is Eurocentric and the title shows how limited it is. The meat (milk, eggs) crisis in the poor world (eg Bangladesh, Zambia) and for the poor in the rich world is not really discussed; there are many people who need some meat, milk or eggs in their diet. In the rich world many people eat too much meat but they also do many other things which are damaging the environment. They eat so much meat, milk and egg because they are cheap. Europeans spend less than 15% of their disposable income on food. This crisis of over-consumption by the rich is easily fixed by pricing and it is not really a crisis, merely a minor issue in a world of overconsumption. Feeding the poor a little animal protein even in the rich world is more of a crisis. If farmers were paid a fair price for meat, milk and eggs, and not subsidised to produce and overproduce, then the supermarket prices would increase and consumption would decrease. Subsidising farmers to over-produce does not allow non-subsidised farmers to compete and causes a major problem in countries outside Europe and the US. The subsidisation of agriculture to produce cheap food, however, is fundamental to consumer-based economies where the use of services and the purchase of manufactured goods are essential for the economy. For non-subsidised farmers exporting to countries with protected farmers, this means the cost of production has to be low, which means low input. So farmers grazing cattle and sheep on pastureland in Oceania, South America and Africa, using biologically sustainable systems, have to have large, low cost units to survive on world price markets.

I don't see animal welfare as a major issue in the global crisis especially given the changes which are occurring in animal-related legislation worldwide. Colin Tudge always writes well and argues persuasively for 'organic farming' but he writes from a Eurocentric or even Anglocentric perspective. This is not sufficient in a world in which a serious food production crisis is looming as the need for milk, meat and eggs by those citizens of the developing and poor world grows rapidly. Organic systems are unlikely to provide what is needed by growing populations in Africa and Asia but will probably keep the rich and well-fed happy and righteous.

I produce lamb and beef in a low-input forage-based system using minimal chemicals but including veterinary medicines, artificial fertiliser and some herbicides and pesticides. My brothers farm in Ireland. I have been paid less than the cost of production for lamb for most of the last 10 years and so have attempted to develop an even lower input system. I am subsidised in no way and sell onto the world market. The rising demand for lamb in China and India has at last impacted on my farm-gate prices and this year I made some profit. The WTO rules help me to survive as a farmer and I support them. My brothers survive financially because of various supports from the EU. As I see it the meat and food crisis is one of poor prices for farmers worldwide. This forces all farmers to lower inputs and become larger units. This reality underpins the constant drive for larger farms. This drive will not change as long as cheap food is considered politically and economically necessary to underpin economies driven by consumption of manufactured goods and services. This is the food crisis and whether we farm organically for the rich or with high welfare standards for the concerned is almost irrelevant. In the rich consuming world, which is causing most of the global problems, human diets are unlikely to be affected by religious tenets, welfare legislation or government regulations. Identifying meat production and consumption as the critical issue and forgetting the rest of our consumption is just doing the 'ostrich'.

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The World of Wolves: New Perspectives on Ecology, Behaviour and Management

Edited by M Muisani, L Boitani and PC Paquet (2010). Published by The University of Calgary Press, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4. 352 pages Paperback (ISBN 978-1-55238-269-1). Price US\$34.95.

Over the past two centuries the conflict between wolves and human beings has reduced the global population of the former to near extinction. Underlying all the eradication programmes undertaken across Europe and North America has been a profoundly negative perception of the wolf, not only by people in general but also by former scholars. Only during the last century has admiration for the wolf returned to our society mainly in the form of scientific research and now the fundamental role of the wolf in wildlife conservation is fully recognised. Nevertheless, the success of this recovery process is strongly dependent on the ability of conservationists to modify the perceptions and attitudes of people regarding the wolf and to make the presence of the wolf near rural areas sustainable from a socio-economical point of view. To accomplish that objective, a first logical step is to gain a good understanding of the relationship between wolves and humans and particularly of the ecological and economical conflict that exist among them. This is the *leitmotiv* of the present

book edited by Marco Muisani, Luigi Boitani and Paul C Paquet, three leading international authorities in the study of wolf biology, behaviour and conservation.

The editors present a series of case studies written by different authors regarding key issues on wolf conservation, coming from different geographic areas, economic and cultural backgrounds. The book has an introductory chapter by the editors aimed at providing a sense of cohesion and shared objectives, followed by 9 chapters clustered into 2 sections.

The first section of the book is entitled 'Re-discovering the role of wolves in natural and semi-natural ecosystems' and includes four chapters. The first two chapters offer the reader an overview on current trends and techniques to explore and classify natural populations of wolves. A clear connection is established between the historical influence of humans in the decline of the wolf population and the future trends in canid evolution. The last two chapters of this section analyse the influence of wolf presence in three different ecosystems in North America.

Chapter one presents recent advances in population genetics in wolves but also in other related canids, with a special interest in the past and present effects of human intervention. After presenting an update on the current techniques of analysing DNA and the statistical methods used for pedigree construction, the author discusses wolf population genetics regarding anthropogenic influences in natural ecosystems, with special emphasis on the loss of genetic diversity. Also, the process of hybridisation with other species of canids, particularly the domestic dog, is discussed.

A provocative discussion of the validity of concepts like species and subspecies opens chapter two. The very existence of wolves as a separate species from other canids, specially domestic dogs, is explored. Authors conclude that canid species are not true species, but rather subspecies of one another. Therefore, hybridisation should be considered a normal phenomenon and hybrids should not be discriminated against in conservation projects.

Chapters 3 and 4 are focused on wolf community ecology, that is the interaction of wolves with other species of the same food web.

The starting point of chapter 3 is the idea that ecological influences of apex predators go far beyond the species they directly prey upon. First, a brief review is presented on key ecological concepts, including the hypothesis of trophic cascades, direct and indirect effects of predators on prey populations and competition between species. This provides a framework for understanding the ecological effects of wolf recovery and re-introduction in natural ecosystems through two case studies depicting two different types of species recovery in a well-known ecosystem. The first analyses the ecological impact of wolves in Banff National Park, Canada's oldest national park, where wolves naturally re-colonised the ecosystem in the mid-1980s. The second explores the effects of the planned reintroduction of wolves in Yellowstone National Park, the world's oldest formally protected national park, from 1995 to 1996. Data from both case studies supports the prediction of the trophic cascade hypothesis,

according to which top-down control by predators on herbivore population results in increased plant biomass. Also, evidence is presented on the indirect effects of depredation by wolves on prey behaviour and habitat selection, both in time and space. In terms of competition between wolves and other carnivores, data collected from the Yellowstone National Park population show evident competition between wolves and coyotes, with the presence of the former causing a 50% decline in the population of the latter.

Very often results of studies on ecological relationships in a particular ecosystem in a particular moment tend to be generalised to other situations. Chapter four's main objective is to explore the validity of that approach by analysing how consistent across time are the relationships between wolves and moose. In order to do so, the Isle Royale community is selected, for it is an ecosystem where wolves and moose have been studied continuously and intensively for five decades. Moose arrived at Isle Royal around 1900 and wolves did so 40 years later. Since 1958, data are available on the ecology of both species. Long-term analysis shows that wolf-moose dynamics change over time. For instance, before 1980 wolf predation had a marked influence on moose population dynamics, whereas after that period other factors, such as winter climate or food availability, became much more relevant. Also, the long-term study of the Isle Royale ecosystem shows that the most dramatic changes in wolf and moose populations were not predicted. This idea is extremely important in a field like ecology, where the ability to explain the past is often mistaken for the possibility to predict the future. Directly quoting the author: "when predictive ability is the judge of knowledge, the growth of ecological knowledge may be a process of discovering ignorance".

The second section of the book is entitled 'Wolves' role in wildlife management planning: human impacts in protected wolf populations, hunting and removal of wolves' and includes five chapters. The different ways humans influence wolf ecology are discussed, from the more passive to the more active interventions.

Chapter one focuses on the effects of the mere presence of human communities near the home-range of 11 wolf packs, particularly regarding the modification of snow conditions by the means of removal or compaction. Wolves have difficulty moving in deep snow. Thus, snow conditions deeply affect wolves' strategies to search for prey. Human-caused snow compaction could create alternative routes into previously inaccessible areas, which would, in turn, increase depredation by wolves and modify prey behaviour and habitat selection. Thus, human modification of the environment could have a strong effect on the ecosystem in the light of the aforementioned trophic cascade hypothesis.

Chapter two starts by analysing the recolonisation by wolves of two northern European countries — Norway and Sweden — very similar in terms of natural conditions, but quite different regarding their underlying cultural, economic and political backgrounds. Negative effects of the wolf presence on human interests include hunting livestock,

killing of dogs, competition with human hunters for big game and the very old fear of wolf attacks on humans. These influences are differentially perceived in the two countries subject to study and that seems to be mainly due to the fact that Norway is more rural than the highly industrialised Sweden. As a result of that, different government policies regarding the control of large predators are found, with Norway being less permissive than Sweden to the presence of wolves. A co-operative research project between the two countries (SKANDULV) and how that initiative might help to influence decisions on conservation issues is also presented.

The results of studies conducted in certain countries are not always easily accessible through the standard search engines for literature research. Chapter three collects and reviews data on ecology and management of wolves from 5 different Eastern European countries, including many unpublished results. One of the most interesting findings is that the legal status of wolves improves with rarity, reflecting, again, the relationship between the extent of the socio-economic conflict between wolves and humans and the derived government policies. In areas of major conflict, the harvest of wolves seems to jeopardise their survival beyond the obvious reduction of the population by decreasing both pack size and stability.

Chapter four focuses attention on the effect of wolf harvesting through the review of an episode when 633 wolves were killed in the Rennie Lake area in northern Canada by only 10 aboriginal hunters, who still rely on hunting for their survival. A big public controversy arose around this case, particularly because of the apparent use of snowmobiles to pursue wolves to exhaustion. Nevertheless, there was no concluding evidence to suggest that it was a common practice. The government stated that current hunting rates were sustainable, although no precise information on the number of wolves in that area is available. Taken together, the facts presented in this case study stress the need to rely on scientific data, rather than media reports and government press releases as valid sources of information. A more comprehensive analysis of the Rennie Lake area in terms of prey-migration dynamics is necessary to determine the exact number of wolves that can be harvested. Also, the strong effects of government decisions on the attitudes and attraction of human hunters to one particular species are shown from this case study. Low numbers of wolves were killed by the Aboriginal people from the Rennie Lake area before 1924, when wolf hides were of less value. From that moment on, different bounties from \$30 to \$300, to encourage wolf harvesting, were periodically introduced by the authorities resulting in an increased numbers of wolves killed.

Finally, chapter five explores the influence of livestock husbandry practices in reducing wolf depredation risk in Alberta, Canada. A conflict between humans and wolves is expected to occur wherever livestock production overlaps with the wolf home-range. Lethal control of wolves is the usual response of wolf depredation and in fact there is a

strong historical correlation between both indicators in Alberta. Results from this case study show that culling wolves is a corrective but not a preventive measure for wolf-caused livestock depredation. Alternatively, husbandry practices including direct supervision of livestock and measures to protect yearling herds seem to be the most efficient strategy to prevent wolf kills. Thus, government investment should probably focus more on helping ranchers develop proper husbandry practices, rather than on direct compensation for confirmed livestock kills by wolves, which might favour a permanent state of conflict.

The present book comes seven years after the outstanding *Wolves: Behavior, Ecology and Conservation*, edited by David L Mech and Luigi Boitani. Both texts are obviously different in format and scope, with the former covering almost all aspects of wolf biology, including behaviour, communication, but also molecular genetics, prey interactions, human attitudes toward wolves and conservation issues. The book under analysis is more than an updated and a comprehensive review on wolf ecology and conservation issues. Its structure from specific case studies allows the reader to fully understand the extent to which decisions on wolf conservation need to be made only after a careful scientific analysis of the wide range of intervening variables for that particular ecosystem in that particular time. Some effects observed in one particular area may or may not be applicable to other ecosystems. For instance, the human influence on wolf ecology due to anthropogenically altered snow conditions could be only relevant in areas with snow coverage exceeding the wolf morphological threshold. To accomplish this ambitious objective the book picks up the best known example for each particular aspect of wolf ecology and conservation. All the chapters follow a similar structure highlighting the methods used to yield conclusions and specific recommendations. Throughout the book the different practical tools available to study wolf ecology and conservation are reviewed, including DNA analysis, radio-telemetry and snow tracking.

Although not isolated from human influences, case studies in North America national parks seem better suited to analyse the dynamics of natural ecosystems than areas in Europe, where interactions between wolves and humans are more intense. Aspects of the ecology of the wolf not directly related to human influence, like predator-prey relationships and trophic cascades, are analysed in areas like Yellowstone National Park or Isle Royal, relatively free from human influence compared to the situation found in Eastern Europe or the Scandinavian countries. Generally speaking, the more salient the influence of humans in a given environment, the more irrelevant or severely distorted the relationships that have characterised predator-prey interactions.

Conversely, to explore the potential conflicts between wolves and people, attention is focused in areas where there are no wilderness protected areas big enough to sustain viable populations of apex carnivores. In fact, wolves disappeared in the past mainly due to direct conflicts with humans as well as a result of the human influence on natural

ecosystems. For instance, wolves disappeared from the Scandinavian peninsula in the early 1970s. Thus, to prevent the failure of the recent re-introduction of the wolf, particularly in heavily populated areas, it is almost mandatory to have a good understanding of the complex interactions between humans and wolves. Only that kind of scientific knowledge will help modify the perception of people about wolves and to make proper decisions in terms of conservation policies, which will allow the maintenance of populations of wolves big and dynamic enough to prevent inbreeding depression. A good example of that is the data coming from the Scandinavian case study showing that the true impact of wolf depredation on livestock does not support people's strong negative perception of the species regarding this particular issue.

Also, the comparison between the approaches regarding wolf management and conservation shows that differences between countries have been and still are extreme, from strong population control to very active protection policies. In contrast with the fact that wolf numbers have increased over the past few decades, the book presents some disturbing evidence for decreasing growth rates in some areas, probably due to poaching and inbreeding depression. Long-term research on Isle Royale is a warning signal against generalisations. Also, it shows that major and more influential changes in a given ecological system are very difficult if not impossible to predict, a phenomenon that has also been described for other complex systems, like meteorology and economy. So, the so-called Precautionary Principle is absolutely necessary when making decisions regarding the management of a particular ecosystem, particularly when results from isolated studies may give us a false perception of our ignorance.

The grey wolf is perhaps one of the world's most intriguing and controversial species. In fact, the wolf is one of the species of mammal that has received more attention by the scientific community and it is deeply embedded in the cultural background of many human societies of the Northern Hemisphere, from the Palaeolithic to the present. Human beings have perceived wolves in a broad variety of ways throughout History, from curiosity and admiration to fear and contempt. These highly polarised attitudes are probably derived from the many similarities that exist between both species and the resulting ecological competition between them. The wolf is a gregarious predator with a very complex social behaviour and highly evolved cognitive abilities only comparable to those observed in primates. They live in family clans where co-operation for hunting, communal care of the youth, group defence and food sharing are prominent features of their social behaviour. All these characteristics are also found in most human societies of hunter-gatherers. Thus, wolves were probably seen by our ancestors as fellow predators as well as direct competitors. Nevertheless, the ecological conflict with wolves increased during the transition of human societies from hunter-gathering to an economy based on agriculture and livestock. This confrontation resulted in the

near extinction of the wolf both in Europe and North America. As an apex predator, the regained presence of the wolf deeply affects both natural ecosystems as well as the human environment. *The World of Wolves* is an outstanding review for scientists and students interested in wolf ecology and conservation, as well as on livestock management and welfare. The proper management of wolves has many implications in terms of animal welfare for both wild species and domestic animals, including livestock and companion animals. Also, the book constitutes a very valuable resource for anyone interested in understanding the highly complex ecological interactions that exist on a terrestrial ecosystem across both time and space.

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The Encyclopaedia of Applied Animal Behaviour and Welfare

Edited by DS Mills (2010). Published by CABI, Wallingford, Oxon OX10 8DE, UK. 704 pp Hardback (ISBN 978-0-85199-724-7). Price £195.00, US\$370.00, €275.00.

When I agreed to review this book, I was not aware that it would so weighty: 4 kg, A4-format and 704 pages. But this book is not just useful for flower pressing, it is one of the most amazing encyclopaedic collections in behavioural biology, featuring more than 1,300 terms, which are not merely described briefly: most contributions are fully fledged essays, sometimes two pages or more in length and often accompanied by relevant quotes. Editor Daniel Mills mastered this enormous task with the help of seven co-editors and a total of 190 experts, mainly from the UK, who wrote the contributions. The topics covered range from 'Abandoned animal' to 'Zygote'. And, in between, one finds general topics, such as 'Reproductive behaviour' or 'Religious slaughter', 'Neuroethology' or 'Reintroduction', but also highly specialised ones, such as 'Dynorphin' (an opioid synthesised in the central nervous system), or 'Deceit behaviour' (I couldn't resist including this because Suzanne Held quoted a paper on deceit in ravens by T Bugnyar and myself; vanity is a component even in science, after all). According to my impression, this is a rather complete collection, including even some rather marginal topics, such as 'Wirkwelt', a term coined by J von Uexküll, hardly relevant in contemporary biology and animal welfare. On the other hand, there are topics which remain uncovered, for example, feather plucking/harvesting from live geese. But this is understandable since it is virtually impossible, in such a broad area, to cover all possible aspects.

It is, indeed, daring not only to include biological topics, but also important proponents and important animals. This is a strength, in principle, but also a weakness, as it makes the biases and omissions even more unavoidable with a book authored by so many different authors. For example, there is an informative account of Ruth Harrison, an important figure in farm animal welfare who, however, is not particularly well known outside the