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The Role of Science in Assessing Animal Welfare
The OIE Code and the Value-Balancing Implications of Applied Science

> The care of animals brings with it often complicated problems of economics, ecology, and science. But above all it confronts us with questions of conscience. Many of us seem to have lost all sense of restraint toward animals, an understanding of natural boundaries, a respect for them as beings with needs and wants and a place and purpose of their own. Too often, too casually, we assume that our interests always come first, and if it's profitable or expedient that is all we need to know. We assume that all these other creatures with whom we share the earth are here for us, and only for us. We assume, in effect that we are everything and they are nothing.
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> Animals are more than ever a test of our character, of mankind's capacity for empathy and for decent, honorable conduct and faithful stewardship. We are called to treat them with kindness, not because they have rights or power or some claim to equality, but in a sense because they don't; because they all stand unequal and powerless before us.
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> -Matthew Scully, *Dominion*, pp. xi-xii.

The assessment of animal welfare determinants is at a strange place in its social and institutional history; although animal welfare norms have arisen from social and ethical—rather than scientific—concerns over the human use of nonhuman animals, the internationalization of animal welfare requires scientifically agreed-upon definitions and procedures in order to pass muster under the auspices of consensus-based intergovernmental organizations. To acknowledge the conceptual history of animal welfare while maintaining the degree of scientific rigor necessary to appease skeptical member states, then, animal welfare scientists use applied rather than basic science to weigh and balance classes of animal preferences against each other, and human against nonhuman animal interests more generally.

There are, however, two primary reasons why animal advocates would be wise to not dismiss the progress to date in codifying international animal welfare standards at the

WTO-sanctioned[1] World Organization for Animal Health (OIE[2]). First, the threat of a new animal rights-motivated 'eco-imperialism' could scare many developing countries away from the negotiating table. Second, the nature of applied science as endorsed by the OIE Permanent Animal Welfare Working Group allows all concerned stakeholders to have a voice, which constitutes a marked improvement over the current livestock industry-dominated policy domain in most of the world outside of the European Community.

Focusing on farm animal welfare (FAW)[3], this paper proceeds in three parts. Part I presents the current literature and knowledge on welfare 'types', species-specific welfare problems in food animal production, and the respective roles of design vs. performance welfare indicators. Part II overviews the progress to date on assessing and codifying animal welfare at the OIE, focusing specifically on the role of science in determining FAW and the statutory codification to date in the Terrestrial Animal Health Code. Part III concludes with a look at the strengths and weaknesses of empowering an organization like the OIE to address international FAW, focusing specifically on the gains and losses to the relevant stakeholders and the range of reasonably available alternatives to the OIE model.

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[1] Much of parts I and II of this paper are drawn from my graduate thesis, *Farm Animal Welfare and WTO Law: Assessing the Legality of Policy Measures*. Under the Sanitary and Phytosanitary Measures Agreement (part of the WTO Treaty and thus coequal as law with the GATT and the GATS), any measures taken pursuant to OIE Code standards will be deemed to comply with the SPS Agreement and, by extension, with the GATT.

[2] In the original French: the Office Internationale des Èpizooties.

[3] Although animal welfare considerations are by no means limited to animals raised for food and fiber production, food animals' demographic share of the total number of animals used by humans constitutes the vast majority of animal use and thus deserves special consideration. This is not to belittle the plight of animals used in research, education, entertainment, and elsewhere, but simply to allocate a scarce resource—my time and attention—most effectively. For a philosophical look at the broad-ranging implications of considering animal interests, see Mary Midgley, *Animals and Why they Matter*, University of Georgia Press: Athens, 1983.

I. Defining and Assessing FAW

Following David Fraser, a noted animal welfare specialist and one of the lead science representatives on the OIE Permanent Group for Animal Welfare, animal welfare requirements can be classified in four broad categories:[4]

- Type I: to maintain basic health and bodily function
- Type II: as responsive to animals' 'affective states'[5]
- Type III: to provide elements of animals' natural behavior[6]
- Type IV: to provide access to light, fresh air and the outdoors[7] (Fraser, 2006)

To provide a contrast: European regulations are often broad in scope, encompassing welfare requirements type I through III. US regulations, on the other hand, tend to

[4] Many such classificatory schemes exist: I choose Fraser's because it captures a hierarchy of needs—similar to Maslow's hierarchy for humans—that allows us as viewers to rank the performance of industry actors according to a set of agreed upon standards. For another point of reference, a second frequently used system is the Animal Needs Index (ANI-35L) governing animal welfare in Austria, which bases its assessment index on five category scores: 1) locomotion, 2) social interaction, 3) flooring, 4) light, air and noise, and 5) stockmanship. The sum of these numbers, each of which is given a numerical value, totals to equal the ANI score. (Zaludik et al, 2007)

[5] Type II requirements—which include anaesthetics for branding, a ban on forced moulting, and the reduced use of electric prods—focus on the scientific study of behavioral and physiological pain and stress indicators. Temple Grandin's insightful *Animals in Translation* notes how profit and welfare can both benefit from type II requirements: "Prods always stress an animal, and when an animal is stressed his immune system goes down and he starts getting sick, which means higher veterinary bills. Plus stressed animals gain less weight, which means less meat to sell. Dairy cattle who've been handled with prods give less milk." (Grandin and Johnson, 20-21) Grandin also cautions that behavioral studies have mixed success in interpreting pain; as prey animals, livestock species are adept at masking discomfort from would-be predators. Similarly, seemingly innocuous conditions of sound and lighting can be particularly stressful to some farm animals.

[6] Type III requirements, such as facilitating hens' ability to perch, dust-bathe and enter a nest box, are growing more common in EU Directives but are only present in the US as label-based, organic and free-range alternatives. Significantly, ignoring type III requirements has health as well as welfare repercussions: hens show behavioral signs of frustration when prevented from laying in a nest, allowing perching improves hens' leg bone strength, and letting sows walk reduces lameness. Although industry implementation of type III requirements would require a substantial conversion cost, Fraser notes that subsequent health benefits should mitigate the expenditure. (Fraser, 100) However, it is unlikely that Type III requirements can be met without addressing the prevailing US conditions of extremely high stocking density.

[7] Type IV requirements mandating access to fresh air and natural daylight, also widely-used in alternative production systems, are rare in regulatory design. Type IV requirements enjoy considerable public support on ethical grounds, and could provide a solution to the health problems inherent in restrictive environments: respiratory illness, lameness, aggression, and self-mutilation. On the other hand, while pasture cows have a lower incidence of mastitis than confined cows, they are also exposed to the ravages of weather, predators and various pathogens. (Fraser, 101) Because type IV requirements are virtually impossible to incorporate fully in existing intensive systems, type IV-related production tends toward free-range and organic production.

support only type I requirements, the one category that is directly related to profit maximization. Of the four welfare categories, type IV is the most difficult to connect to a minimalist definition of health; a controlled environment (indoors) is, by definition, safer than one that is semi-controlled (outdoors).

I. A. Species-Specific Welfare Considerations

The husbandry practices to which different livestock in intensive systems are subjected have various species-specific deleterious effects, so I will briefly address each of the major industries in turn;[8] an overview of some of the more egregious welfare-reducing effects that confined animal feeding operation (CAFO) systems and current slaughter procedures[9] can have on animals clarifies the ethical underpinnings of such policy considerations, and, more generally, the purpose for engaging this material.

Broilers. The welfare-damaging husbandry practices to which poultry are subjected include: debeaking, forced moulting (forced starvation to speed up the laying cycle), live disposal of male chicks, and intensive stocking. Indicators of pain and stress on enclosed poultry include: injury caused by pecking, space constraints on preening, bone and muscle weakness, stereotypic repeated behavior, abnormal behavior due to impaired access to litter for dust-bathing and to nest sites for laying, and feather loss. (Bennett et al, 2003) Modern breeding programs have also developed breeds that grow faster to yield maximum chicken weight in minimum time, which itself causes severe

[8] For a more comprehensive (but slightly dated) overview, see Bernard E. Rollin, *Farm Animal Welfare: Social, Bioethical, and Research Issues*. Iowa State University Press: Ames, Iowa, 1995.
[9] For a US example, see Gail A. Eisnitz, *Slaughterhouse: the Shocking Story of Greed, Neglect, and Inhumane Treatment Inside the U.S. Meat Industry*. Prometheus Books: New York, 1997.

muscle strain and abnormal leg conditions as chickens' bodies outgrow their legs' carrying capacity. (Olsson et al, 2006)

Layers. Layer hens in battery cages suffer primarily from problems related to stocking density. Whereas UK producers, for a point of reference, often stock between 34 and 40 kg/m², standard US densities are generally twice the UK standard. As a study conducted by A.L. Hall and the Oxford School of Zoology illuminates, the link between welfare and stocking density is incontrovertible. The higher density resulted in: increased mortality, a greater incidence of leg problems, increased contact dermatitis and carcase bruising, increasingly disturbed resting behavior, decreased pecking and locomotion, and altered lying and preening patterns. (Hall, 2001) Another study, documenting feeder space allowance and agonistic behavior, showed similar results: as feeder space increases, the mean agonistic acts per bird per hour during feeding decreases. Significantly, however, feeder space had no effect on growth rates. (Olukosi et al, 2001)

Hogs. A quote from one unpleasant account encapsulates the hog industry's most problematic practices: "pigs are castrated and have their tails removed without anaesthetic. Moreover, gestating (pregnant) sows and farrowing (birthing) sows are housed in stalls where they are unable to turn around. Such intensive farming practices result in health problems, including lameness or high death rates, which are aggravated by uncontrolled genetic selection for production traits such as rapid growth" (Wolfson, 1996)

Cattle. Similarly with beef and dairy production, "day-old baby calves are transported from the dairy farm before they are able to walk, resulting in calves being thrown, dragged, or trampled. This practice is becoming increasingly accepted . . . Veal

calves are housed in stalls where they are unable to turn around. The calves are fed a liquid diet that does not allow the normal function of the calf's rumen. In addition, cattle are dehorned, castrated and hot-iron branded without anaesthetic." (Wolfson, 1996) High milk yield—whether due to BST or specialized breeding practices—also significantly increases the occurrence of mastitis and reproductive problems in dairy cows. (Olssen et al, 2006)

I. B. Performance and Design Welfare Indicators

In order to overcome the above-mentioned species-specific differences, most FAW measures focus instead on the broader categories of performance and design measures. Whereas performance measures examine the actual welfare state of the animals according to behavioral, physiological, and other ethological indicators, design criteria focus instead on changing the housing and other conditions in which the animals are reared. Performance criteria are generally preferred for their greater reliability in translating animals' affective states,[10] but design indicators are often preferred by livestock owners and operators as being easier and more straightforward to implement. In reality, all FAW measures are a combination of both design and performance criteria, with the real question being one of prioritization and emphasis.

In addition to species-specific factors, performance criteria-based welfare assessments of suffering are made from a combined inspection of physical health,

[10] The literature on translating animals behaviors and interests is wide-ranging and growing. See, for example, M. B. Jensen, L. J. Pedersen, and J. Ladewig, "The use of demand functions to assess behavioural priorities in farm animals", *Animal Welfare* 13 (2004): 527-32. E. M. Scott, A. M. Nolan, J. Reid and M. L. Wiseman-Orr, "Can we really measure animal quality of life? Methodologies for measuring quality of life in people and other animals", *Animal Welfare* 16, no. 5 (2007): 17-24. F. Wemelsfelder, "How animals communicate quality of life: the qualitative assessment of behaviour", *Animal Welfare* 16, no. 5 (2007): 25-31. Broom, D. M., "Quality of life means welfare: how is it related to other concepts and assessed?", *Animal Welfare* 16, no. 5 (2007): 45-43.

physiological signs, behavior, and design characteristics of housing systems.[11] Once such performance criteria are scientifically established, design criteria are modeled around the performance goals.

II International Regulatory Harmonization: FAW and the OIE

Also called the World Organization for Animal Health, the Office Internationale des Èpizooties (OIE) has branched out from its founding mandate to deal with global health pandemics in 1924 to become the leading international body working on the assessment and codification of farm animal welfare regulations. The OIE's work on animal welfare has picked up speed over the last five years. First identified as a priority in the OIE Strategic Plan 2001-2005, the OIE adopted the FAW mission in 2002, and has subsequently sponsored the first Global Conference on Animal Welfare (which met in Paris from 23-25 February 2004) and is planning a second Global Conference to be held in Cairo in October 2008.

A Permanent Animal Welfare Working Group was established by the Member states at the 70th OIE General Session in May 2002. Five of the animal welfare codes to be included in the OIE *Terrestrial Animal Health Code* were adopted at the 73rd General Session, in May 2005, which cover conditions pertaining to transport and slaughter.

As Bernard Vallat, OIE Director-General notes in the Foreword to the First Global Conference,

> the OIE's aims in the field of animal welfare consist first and foremost of proposing guidelines for adoption by our International Committee.

[11] Following a battery of tests that approach objectivity in revealing preferences as accurately as is reasonably possible without the direct verbal communication to which human interactions have recourse, Dawkins reaches the following conclusion: "animals suffer if kept in conditions in which they are without something that they will work hard to obtain, given the opportunity, or in conditions that they will work hard to get away from, also given the opportunity." (Dawkins 36, 2006)

> Member countries wishing to engage in trade in animals or animal products will then be able to use these guidelines on a bilateral basis…Ultimately, these guidelines will also lead to a gradual harmonisation of existing national and regional legislation…

This reading of the OIE's role accords with the advisory function of OIE and Codex regulations more generally, and with the EU's gradualist legal and policy strategy in particular.

This section proceeds in two parts. Part A examines the role of science in the codification of FAW norms, pointing out in particular how FAW science is applied rather than basic science and, as such, necessarily involves a balancing of different disciplinary views with and against each other. Part B looks at the Terrestrial Animal Health Code to determine what measures would be justified as OIE-approved.

II. A. The Role of Science in Assessing FAW

In some respects, the deference to expert authority in the form of scientific validation is the linchpin without which international cooperation in the assessment of FAW and FAW measures would be far less likely to succeed. However, this deference is not without bias. Different stakeholders have different views about which kinds of science should be preferenced.

As David Fraser notes

> Within society, we can discern three different views about what is important for animal welfare. One is a 'biological functioning' view which holds that animal welfare depends on a high level of health, growth, production efficiency and correlated traits; this view is especially common among intensive animal producers and some veterinarians and animal scientists. A second is a 'natural living' view which holds that animals should be free to lead relatively natural lives and to use their species-typical adaptations, often in a relatively natural environment. This view is common among consumers and many critics who object to the industrialisation of animal agriculture. A third view emphasises the 'affective states' of animals and advocates preventing negative states (pain, suffering) and permitting positive states (comfort,

> contentment). This view is common in humanitarian thinking and among some animal welfare scientists…It would be reassuring to think that science could arbitrate among these views…Instead, we see different scientists incorporating these different views of animal welfare into their scientific work. (Fraser, 2004)

The objective, then, is "to strike a defensible balance among the[se] three elements" of biological functioning, natural living, and affective states.[12]

It follows that different stakeholder groups will have differing views on which element predominates. To take one example,

> Perdue Farms Incorporated states that it abides by "scientifically sound" guidelines based on principles from the American humane Association and the National Chicken Council. Veterinarians, outside experts and Poultry Welfare Officers from the Poultry Welfare Council sign off on the welfare of Perdue's birds. Both drawing selectively from scientific literature and convening expert panels can be flexibly applied. *Value judgments concerning the relative importance of one welfare indicator over another* (e.g., behavioral vs. physiological) or concerning the relative importance of maintaining profitability in certain producer groups…may influence the way that science is used in developing welfare standards (Thompson *et al*, citations omitted, emphasis added)

The same tendency to overemphasize one relevant category—in this case, 'biological functioning'[13]—at the expense of others while maintaining full backing by relevant scientific data is equally true for proponents of 'natural living' and 'affected states'.

Animal welfare science is applied rather than basic science, and therefore the three categories in question can each be linked to the relative weight placed upon them by

[12] And this is as it should be, because "Animal Welfare is not a term that arose in science to express a scientific concept. Rather it arose in society to express ethical concerns regarding the treatment of animals." (Duncan and Fraser)

[13] Thus do many in the "livestock production advocates" camp tend to view animal welfare through a powerfully human-oriented lens. For one particularly striking case, a 1981 publication by the US Council for Agricultural Science and Technology (1981) entitled *Scientific Aspects of the Welfare of Food Animals* proffered the following definition of welfare: "the principle (sic) criteria used thus far as indexes of the welfare of animals in production systems have been rate of growth or production, efficiency of feed use, efficiency of reproduction, mortality and morbidity." (CAST 1981, from Rollin 2007)

The "livestock production" view of welfare, influenced by public influence over the last two decades, would be unlikely to issue another such bald statement equating the primary parameters of animal unit profitability with animal welfare. Nonetheless, more recent claims, such as Tom Crenshaw's statement in reference to the gestation crate, "it's true that the animals can't turn around, but whether they have a need to do that is difficult to prove" (Jennings 2007) demonstrate the continued prevalence of such views.

the different scientific subdisciplines that together form the animal welfare scientist's gestalt whole: ethology, veterinary pathology, veterinary epidemiology, and stress physiology.[14] (Sandøe *et al*, 41) To further illustrate the manner in which disciplinary predisposition weights the outcome of stocking density valuation, an ethologist will most likely conclude

> That free range hens have a better life than battery hens in traditional barren cages because they can exercise a number of behaviours that battery hens cannot (e.g. dust bathe, scratch and lay their eggs in a nest). Other applied scientists have based their views on veterinary pathology. They have come to the conclusion that battery hens have the better life because their mortality rates are much lower than those of free range hens. (Sandøe *et al*, 43)

Just as human interests in civil and political rights can clash with human interests in economic and social rights,[15] with the result being a necessary weighing and balancing of rights one against the other, animal welfare scientists must weigh the preponderance of evidence and interests for and against various positions by using the disciplinary optics of basic science to inform their applied decisions.

The role of science at the OIE, then, is the laudable and practical task of balancing different views within compartmentalized areas of the scientific community about what constitutes welfare. Thus, the result is not a basic scientific decision about testing a hypothesis, but is rather a value-laden balancing test;[16] as a discipline that grew out of

[14] Nonhuman animals cannot literally tell their doctors: "Ow, that hurts!" It is therefore important to be able to assess pain in other ways, for which see K. M. D. Rutherford, "Assessing Pain in Animals", *Animal Welfare* 11 (2002): 31-53.

[15] While acknowledging the centrality of the basic idea of conflict of rights, this can be analogized in the human context quite easily. Humans have often conflicting interests and preferences, and so too do other animals. For example, I might have an organoleptic interest in eating a hot fudge sundae, but balanced against that are my biological interest in physical health and longevity and my normative interests in the welfare of dairy cows, sugar cane plantation workers, and so forth.

[16] As Sandøe *et al* put it, "where an applied ethologist might ask 'Do sows need nest building material or not?', a scientist doing basic work in ethology would probably find the question 'Why is the domestic pig one of the few hoof-bearing animals that constructs a nest?' much more interesting. In basic science, questions become more interesting the more generally applicable they are. The first question above is very

social demand rather than scientific rigor per se, animal welfare science necessarily engages in policy-like decisions of interest- and preference-balancing.

Crucially, however, this is not to say that animal welfare science is non-science; rather, it is fed by the groundwork of basic scientific work in various disciplines that help to reveal animal preferences and explain animal physiology and biology without granting unqualified supremacy to any one discipline of basic scientific work.[17] The problems of applied science, rather, are problems of valuation, potential incommensurability,[18] and a need for applied science to keep pace with basic science.[19] Nonetheless, using applied science as a balancing measure is the best available policy measure to bridge the goals and interests of the various stakeholders.

II. B. Statutory Codification in the OIE Terrestrial Animal Health Code

One of the difficulties of writing a policy advice briefing on international FAW measures relates to the rapidly changing terrain in the scientific discovery and regulatory codification of FAW measures at the OIE. Much as the EU's Welfare Quality report[20] is

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restricted…It follows that the answers to it will not help us to understand the behaviour of other species." (Sandøe *et al*, 42)

[17] Again, an analogy could be made for the study of human welfare, a domain similarly fraught with claims vying for supremacy; the welfare economist, for example, has a very different idea of what constitutes preference satisfaction than does the anti-globalization neo-luddite, whose preferences for the human 'ideal set' do not themselves line up with those of, say, the religious fundamentalist. Granted, these are not scientific studies and therefore do not fall under the same umbrella as applied FAW science, for the closest analogs to animal welfare science would be behavioral science and human psychology.

[18] Incommensurability of values is a broader problem that is more often thought of in specifically human contexts (e.g., the incompatibility of total freedom and total security), but similar problems of valuation may well apply to nonhuman animal interests as well.

[19] For which see J. McGlone, "Changing concepts of farm animal welfare: bridging the gap between applied and basic research", *Applied Animal Behaviour Science* 81, no. 3 (2003): 199.

[20] The EU has enacted a range of Community-wide legislation mandating minimum welfare standards over the last few decades, and is currently operating a five-year project, to be completed in 2009, titled "Welfare Quality: Science and society improving animal welfare in the food quality chain" at a cost of 16 million Euros. A part of the much-vaunted "from farm to fork" EU-wide program, the Welfare Quality "research program is designed to develop European standards for on-farm welfare assessment and product

not due to produce end-result EU-wide standards until 2009, the codificatory process at the OIE has so far only addressed transport and slaughter conditions.

In keeping with its origins as an organization created in the interwar period to combat the spread of epidemic zoonoses, the majority of the Terrestrial Animal Health Code focuses on disease-preventive measures.[21] Animal Welfare, in the appendices section, is Section 3.7 of the Terrestrial Animal Health Code.

Section 3.7 of the Terrestrial Animal Health Code contains the following guidelines regulating animal welfare.

- Appendix 3.7.1. Introduction to the Guidelines for animal welfare
- Appendix 3.7.2. Guidelines for the transport of animals by sea
- Appendix 3.7.3. Guidelines for the transport of animals by land
- Appendix 3.7.4. Guidelines for the transport of animals by air
- Appendix 3.7.5. Guidelines for the slaughter of animals
- Appendix 3.7.6. Guidelines for the killing of animals for disease control purposes

Most notably, the OIE does not yet address guidelines for housing conditions and permissible stocking densities.

Unlike the lengthy and detailed guidelines laid out in Appendices 3.7.2 through 3.7.6., Appendix 3.7.1. is presented in the more hortatory and general tone one often finds in introductory sections to international treaties. Nonetheless, it contains a number of key provisions that are intended to guide the OIE's interpretation of animal welfare provisions. In its entirety, Appendix 3.7.1 reads as follows:

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information systems as well as practical strategies for improving animal welfare." From www.welfarequality.net, last visited April 20, 2008; EU funded project FOOD-CT-2004-506508.

[21] Part 1 of the Terrestrial Animal Health Code addresses risk analysis, veterinary control of diseases in importing and exporting countries, quarantine procedures, and procedures for measurement of biological animal health. Part 2 outlines response procedures for specific diseases, whether as ailments that strike multiple species (Section 2.2), cattle (Section 2.3), sheep and goats (Section 2.4), equines (Section 2.5), swine (Section 2.6), avian species (Section 2.7), hares and rabbits (Section 2.8), bees (Section 2.9), and other diseases (Section 2.10). Part 3 contains a variety of appendices, and Part 4 includes model international veterinary certificates.

Guiding principles for animal welfare (Article 3.7.1.1.)

1. That there is a critical relationship between animal health and animal welfare.
2. That the internationally recognised 'five freedoms' (freedom from hunger, thirst and malnutrition; freedom from fear and distress; freedom from physical and thermal discomfort; freedom from pain, injury and disease; and freedom to express normal patterns of behaviour) provide valuable guidance in animal welfare.
3. That the internationally recognised 'three Rs' (reduction in numbers of animals, refinement of experimental methods and replacement of animals with non-animal techniques) provide valuable guidance for the use of animals in science.
4. That the scientific assessment of animal welfare involves diverse elements which need to be considered together, and that selecting and weighing these elements often involves value-based assumptions which should be made as explicit as possible.
5. That the use of animals in agriculture and science, and for companionship, recreation and entertainment, makes a major contribution to the wellbeing of people.
6. That the use of animals carries with it an ethical responsibility to ensure the welfare of such animals to the greatest extent practicable.
7. That improvements in farm animal welfare can often improve productivity and food safety, and hence lead to economic benefits.
8. That equivalent outcomes based on performance criteria, rather than identical systems based on design criteria, be the basis for comparison of animal welfare standards and guidelines.

Scientific basis for guidelines (Article 3.7.1.2.)

1. Welfare is a broad term which includes the many elements that contribute to an animal's quality of life, including those referred to in the 'five freedoms' listed above.
2. The scientific assessment of animal welfare has progressed rapidly in recent years and forms the basis of these guidelines.
3. Some measures of animal welfare involve assessing the degree of impaired functioning associated with injury, disease, and malnutrition. Other measures provide information on animals' needs and affective states such as hunger, pain and fear, often by measuring the strength of animals' preferences, motivations and aversions. Others assess the physiological, behavioural and immunological changes or effects that animals show in response to various challenges.
4. Such measures can lead to criteria and indicators that help to evaluate how different methods of managing animals influence their welfare.

The list of elements addressed in 3.7.1. reflects both the likely negotiating history of the animal welfare provisions of the Terrestrial Animal Health Code and the extent to which the "five freedoms" and the "3Rs"[22] have become accepted criteria. More broadly, appendix 3.7.1. reflects the OIE working group's realization both that animal welfare science is applied science, and that its mediation in society involves an engaging of all affected stakeholders.

A critical reading of 3.7.1.1 reveals the likely negotiating history that afforded livestock producers paragraphs 5 and 7 and granted the other paragraphs to what could broadly be termed the advocacy camp. In my view—and with an understanding of the charged welfare vs. rights debate—this give-and-take represents the optimal position for farm animal advocates to engage with livestock producers to bring about practical and realizable gains in the here and now, rather than engaging in Manichaean denunciations with little large-scale empirical effect.

III. Lessons Learned: Animal Advocacy in a Globalizing World

In the context of international regulatory harmonization, the 'Good' can often be the enemy of the good, the ideal a hindrance to the real; well-meaning animal advocates can sometimes tend to focus exclusively on domestic priorities[23] while not addressing the needs and concerns both of differently-situated countries and of the international legal and regulatory system more generally. The main purpose of this paper has been to show that scientifically adduced FAW standards as codified by existing and proposed OIE codes and standards will be—indeed, are—welcomed by gradualist animal advocates, but

[22] This paper, again, is focused specifically on farm animal welfare and thus does not address the welfare of animals used for behavioral and toxicological research.
[23] And not without good reason: they are immediately situated in local, not global, political contexts.

will probably be opposed by strict abolitionists: rather than removing values from the discussion, using applied science provides a critical role for values-driven welfare objectives in the balancing test that necessarily factors into the weighing and assessing of welfare determinants.

Nonetheless, there are clear winners and losers when choosing such a dialogic model of FAW assessment. The array of interested stakeholders[24] who would gain or lose from such an approach corresponds to whether or not the interested parties stand to gain or lose from dialogue and collaboration with opposed stakeholders more generally. Accordingly, abolitionists like Gary Francione[25] would tend to view this application of applied science as just another manifestation of 'new welfarism', just as recalcitrant food industry stakeholders like KFC would be likely to scoff at the implied cooperation with animal rights activists that applied science at the OIE entails. Gradualist stakeholders like HSUS or Niman Ranch (or even McDonald's[26]), on the other hand, would likely endorse this form of stakeholder engagement.[27]

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[24] I refrain from conducting an in-depth stakeholder analysis. For an overview of the non-governmental agencies with a stake in animal advocacy, see "Animal Welfare: the role of non-governmental organizations," *Rev. Sci. Tech. Off. Int. Epiz.*, Vol. 2, no. 24, 2005, pp.625-638. Other relevant stakeholders include, most prominently, domestic and foreign livestock industry companies and trade associations, government oversight and regulatory agencies, and the citizen and consuming public.

[25] A prominent animal use abolitionist, some of Gary L. Francione's views on the issue can be seen at http://www.abolitionistapproach.com.

[26] As the industry leader in fast food supply chain sourcing, McDonald's has been very active in driving voluntary industry standards. See Keith Kenny, "McDonald's: Progressing Global Standards in Animal Welfare" (in *Animals, Ethics, and Trade: the Challenge of Animal Sentience*) for a company spokesperson's perspective.

[27] This paper has not explicitly addressed the heated animal welfare 'vs.' animal rights divide that is currently playing out in the animal advocacy domain. For an important explication of the latter view, see Steven Wise, *Rattling the Cage: Toward Legal Rights for Animals*. Perseus Books: Cambridge, 2000. For an indication of how the even more heated debate between animal protectionists and livestock producers can tend to distort the truth of both sides' arguments, see D. Fraser, "The "New Perception" of animal agriculture: Legless cows, featherless chickens, and a need for genuine analysis", *Journal of Animal Science*, Vol. 79, 2001, pp. 634-641.

What, then, are the merits and demerits of the applied science approach to assessing and accounting for animal interests? A rephrasing of this question reads: whose interests are preferenced, and whose are marginalized? As I indicated above, an applied science approach would tend to prioritize welfare considerations that that both livestock producers and animal advocates agree on as topics to be addressed first—a utilitarian 'low-hanging fruit' approach—and would only move to more contentious issues at a later date (or if at all, the skeptic might contend).

This finding is in keeping with the contents of the OIE Terrestrial Animal Health Code, which to date has addressed only slaughter and transport conditions and has tabled the discussion of stocking density and housing conditions. Whereas animal advocates and livestock producers can generally agree, at the basic level of determining animal interests, that adverse transport conditions and unregulated slaughter conditions can create pain, distress, and other negative behaviors in animals, many livestock producers attempt to marshal evidence[28] that CAFO systems produce superior welfare results than do extensive agricultural systems.

A further potential shortcoming of the applied science approach is the extent to which the majority of the inputs that deserve balancing one against the other are derived from basic science (disciplinary iterations on the above mentioned 'three elements') and generally not from ethics or other more value-driven discourses.[29] It should be

[28] In addition to the discussion, *supra*, in II.A., see, for example, the Feedstuffs FoodLink (available at www.feedstuffs.com) for such arguments as: "stalls can be in a sow's best interests", "Are free range hens happier? Maybe not", "Free-range hens experience stress", and so forth.

[29] For an interesting discussion of the role of ethics in determining FAW, see P. Sandøe, S. B. Christiansen, and M. C. Appleby, "Farm Animal Welfare: the Interaction of Ethical Questions and Animal Welfare Science", *Animal Welfare* 12 (2003): 469-478. Sandøe et al break the ethical discussion down according to the following four questions: "What is the baseline standard for morally acceptable animal welfare? What is a good animal life? What farming purposes are legitimate? What kinds of compromise are acceptable in a less-than-perfect world?"

emphasized, however, that this shortcoming works both ways: livestock producers can refer to their own value-driven profit motive—and consumers can refer to their own value-driven interest in the lowest possible grocery costs—as means to dismiss the consideration of animal interests entirely. Using the optic of applied science to reveal animal interests and balance their consideration against the interests of livestock producers and others is thus generally a more viable alternative even from the perspective of animal interests, considering the relative policy-influencing power of the different stakeholders in question and the economics-preferencing disciplinary climate in which the modern world functions.

In my view, rather, the greatest weakness of the applied science model as it is currently implemented is the failure of the OIE to fully address positive welfare goals. Instead, the OIE Working Group has focused largely on what Sir Isaiah Berlin termed negative—or 'freedom from'—liberties, in this case the animals' interest in being free from suffering. FAW has not yet advanced sufficiently in the domain of 'freedom to' goals.[30] This critique, however, is directed more at the current state of affairs than at the methodology of applied science *per se*, insofar as positive animal interests can be scientifically adduced and accordingly balanced. Nor is the state of affairs entirely unjustified; addressing 'freedom from' measures is generally more straightforward, and is thus regarded as a 'lower-hanging fruit' which can yield more net welfare per unit of effort expended.

[30] For an interesting article relating to this subject, see D. Fraser and I. J. H. Duncan, "'Pleasures', 'Pains' and Animal Welfare: Towards a Natural History of Affect", *Animal Welfare* 7 (1998): 383-396.

On net, the use of a stakeholder dialogue model of applied science in codifying the OIE Terrestrial Animal Health Code creates a useful focal point[31] to provide policy and institutional leadership in the assessment, implementation, and eventual enforcement of animal welfare standards in international commerce. Using an applied science model allows citizen values a seat at the policy table without undermining the credibility of the negotiation process for OIE member states, and it helps to cement the resolution of a longstanding debate over the role of science in determining animal welfare[32] so that progress on the ground can ensue unimpeded.

[31] In the international regulatory domain, it is often critical that policy areas avoid institutional proliferation and instead choose a single focal point to clarify and strengthen the moral, political and legal suasion of their objectives. See the recent work of Daniel Drezner for further clarifications on this point. Animal issue-focused NGOs often 'suffer' from this form of proliferation, but as long as their efforts can be fruitfully funneled into one or few institutional receptacles, the net outcome should be largely positive.

[32] For a nuanced alternative view, See C. J. Barnard and J. L. Hurst, "Welfare by Design: the Natural Selection of Welfare Criteria", *Animal Welfare* 5 (1996): 405-433.

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