



assessment report

Wageningen University

external peer review WIAS

Wageningen Institute of Animal Sciences

2015

assessment report

## Table of Contents

<b>Preface</b> .....	2
<b>1. Introduction</b> .....	3
1.1 The evaluation system .....	3
1.2 The Peer Review Committee .....	3
1.3 Scope of the assessment, assignment to the Committee .....	4
1.4 Input for the research assessment .....	5
1.5 Working procedure and site visit of the Committee .....	5
1.6 Assessment criteria and Rating .....	6
<b>Caveat: remarks on numerical scoring</b> .....	7
<b>2. Structure, organisation and mission of WIAS</b> .....	8
2.1 Introduction .....	8
2.2 Mission and Ambitions of the Graduate School .....	8
2.3 A coherent research and PhD training programme .....	8
2.4 Management and organisation .....	9
<b>3. Performance of the Graduate School WIAS and its Chair groups</b> .....	11
3.1 General remarks .....	11
3.2 Graduate School WIAS.....	12
<i>The research environment for the PhD programme</i> .....	12
<i>PhD training and education programme</i> .....	12
<i>Integrity</i> .....	12
<i>Conclusion</i> .....	12
<i>Recommendations</i> .....	13
3.3 Chair groups WIAS.....	14
<i>Adaptation Physiology (ADP)</i> .....	14
<i>Animal Breeding and Genetics (ABG)</i> .....	16
<i>Animal Nutrition (ANU)</i> .....	18
<i>Animal Production Systems (APS)</i> .....	20
<i>Aquaculture and Fisheries (AFI)</i> .....	21
<i>Behavioural Ecology (BHE)</i> .....	23
<i>Cell Biology and Immunology (CBI)</i> .....	25
<i>Experimental Zoology (EZO)</i> .....	26
<i>Host-Microbe Interactomics (HMI)</i> .....	28
<i>Human and Animal Physiology (HAP)</i> .....	30
<i>Quantitative Veterinary Epidemiology (QVE)</i> .....	32
<b>Annexes</b>	
1. Criteria and scores of the national protocol SEP .....	34
2. Site visit programme.....	36
3. Brief CV's of the Committee members .....	38
4. Summary quantitative data Chair groups WIAS .....	41

## **Preface**

This report presents the findings and recommendations of the international Peer Review Committee that evaluated the Graduate School Wageningen Institute of Animal Sciences (WIAS) and 11 of its basic research units (Chair groups). The assessment has followed the (new) national Standard Evaluation Protocol 2015-2021 (SEP) for research assessments, developed by VSNU, KNAW and NWO. The review was based on the documentation provided, covering the six-year period 2009-2014, and a 4-day site visit (June 22-26, 2015).

The Committee would like to thank the WIAS staff for their carefully prepared documentation and for their cooperation during the assessment.

Prof. dr. Barbara Cannon  
Chair, Peer Review Committee WIAS  
October, 2015

## Introduction

### 1.1 The evaluation system

All publicly funded Dutch universities are bound to the Standard Evaluation Protocol (SEP), the national protocol for the quality assessment of their research that has been in place since 2003 but revised twice since. The generic objectives have not been changed however, and are threefold:

- *improvement* in the quality of research through an assessment carried out according to international standards of quality and relevance
- *improvement* in research management and leadership
- *accountability* to the higher management levels of the research organisations and to funding agencies, government and society at large

The national evaluation system is based on external evaluations, organized once every six years, and informed peer review by independent international experts that assess research units with a clearly defined shared strategy on three main criteria:

- Quality
- Relevance to society
- Viability

Although no longer obligatory in the present SEP 2015-2021, up to 2015 internal midterm reviews were conducted in between external assessments, following a lighter procedure aimed at capturing what has been achieved since the last external peer review.

The final qualitative judgement of the Committee on each criterion is to be supplemented with a quantitative score on a discrete scale with four categories (4: unsatisfactory, 3: good, 2: very good, 1: world leading / excellent), replacing the former five-point scale of the previous SEP versions.

In addition, the Committee provides a qualitative evaluation of each unit's:

- contribution to the supervision and instruction of PhD candidates
- policy on research integrity

Until 2015, Dutch Graduate Schools could apply for accreditation by a special commission (ECOS) of the Royal Netherlands Academy of Arts & Sciences (KNAW). With the introduction of the SEP 2015-2021, the ECOS was disbanded. Graduate Schools that wish to maintain their accreditation now have to be included in a SEP evaluation. To that end, additional directions have been drawn up in consultation with the KNAW and SODOLA, the Dutch network of accredited graduate schools. These have been partly incorporated in the SEP, and partly in additional guidelines published separately afterwards.<sup>1</sup>

The Committee is bound by the instructions laid down in the SEP and further detailed in the Terms of Reference, formulated by the Board of the University. It bases its judgement on written documentation provided by the research unit (including a self-evaluation report) and on interviews with representatives of the research units and other relevant bodies during a site visit.

The findings of the Committee are to be made public on the University's website.

### 1.2 The Peer Review Committee

The Committee members for this assessment were appointed by the Executive Board of Wageningen University (hereinafter WU Board), after a thorough selection procedure assuring an authoritative, critical and independent assessment of the research institutes. All Committee members signed a statement of impartiality and confidentiality (see SEP appendix C) to ensure a transparent and independent assessment process.

---

<sup>1</sup> This refers to the 'Handreiking kwaliteitsbeoordeling onderzoekscholen' ('Guidelines for quality assessment for graduate schools', in Dutch), agreed upon in December 2014 by all parties involved.

The Committee consisted of:

- Prof. dr. B. (Barbara) Cannon, Stockholm University, Sweden (chair)
- Dr. B. (Benoit) Fauconneau, INRA Bordeaux-Aquitaine Research Center, Bordeaux, France
- Prof. dr. S. (Stephen) Hall, CGIAR World Fish Center
- Prof. dr. J.E. (Jan Erik) Lindberg, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden
- Prof. dr. F. (Frauke) Ohl, University of Utrecht, Netherlands
- Dr. T. (Thierry) Pineau, INRA Animal Health Division, France
- Prof. dr. G. (Graham) Plastow, University of Alberta, Canada
- Dr. J.M. (Jules) van Rooij, Research & Valorisation, University of Groningen, Netherlands (secretary)

Additional information on the Committee members can be found in annex 4.

### 1.3 Scope of the assessment, assignment to the Committee

As instructed in the WU Board's Terms of Reference, the assessment comprised two levels of aggregation: that of the graduate school Wageningen Institute of Animal Sciences (WIAS) and that of its basic research units, the Chair groups participating in WIAS.

For WIAS, emphasis was on its contribution to the training, supervision and education of PhD students in the broad field of Animal Sciences, and the quality of the research environment it offers. The WIAS assessment is also needed for continuation of its status of accredited graduate school, the current ECOS accreditation dating back to 2011.

In accordance with the SEP/SODOLA directions, the Committee was requested to indicate whether WIAS complies with the following conditions:

1. It provides a well-organized, coherent and productive research environment for the PhD programme.
2. It offers a sound and institutionalised programme in which students are trained to become independent researchers
3. It functions as an independent organisational unit with its own budgetary and managerial responsibility, with the university or universities involved providing a level of financing for a period of at least six years that can be described as sufficient in view of the graduate school's planned capacity

Relevant for this part of the assignment is that it was preceded in early 2015 by a University-wide evaluation of the Wageningen doctoral education, conducted by an expert panel of the European University Association (EUA). This evaluation addressed the extent to which:

- The intended learning outcomes of the Wageningen PhD programme meet international standards.
- The Wageningen PhD programme has the structure and processes in place for PhD candidates to attain these learning outcomes.

The results of this EUA evaluation formed part of the documentation provided to the Committee.

Consequently, the WIAS judgement presented in section 3.1 focuses on the quality of the WIAS contribution to the Wageningen PhD programme and is limited to a narrative judgement, as stipulated by the SEP.

The assessment of the WIAS Chair groups focused on the quality, relevance to society and viability of the research. The Committee was requested to report its judgement on these three criteria in clearly worded arguments, taking into account the group's strategy and the aspect of research integrity, and to make specific recommendations for improvement. In addition, the judgement of the Chair groups had to be expressed in a discrete score on each criterion and motivated in descriptive terms (with arguments) (see below).

The Committee's evaluation of research integrity, to be reported in descriptive terms only, was based on the Chair groups' internal research culture and the University's policy on research integrity, prevention of integrity violations, research data management and on the extent to which an independent and critical pursuit of science is made possible.

#### **1.4 Input for the research assessment**

This assessment is based on both written documentation provided in advance, and on interviews, presentations and discussions during the site visit with Chair group leaders and researchers, the WIAS management, representatives of the WU and WIAS Boards, WIAS stakeholders and, last but not least PhD students and council.

The Committee received a 256-page self-evaluation report comprising two parts.

Part A described the general organization of Wageningen University and Research Centre and addressed issues relating to the research and PhD programmes at the level of the graduate school WIAS, including overarching structures and regulations on research integrity. It also provided an extensive in-house bibliometric analysis yielding an overview of the publication output and citation impact at both WIAS and Chair group level, based on Thomson Reuters' Web of Science (WoS). In addition, the distribution of all units' WoS publications over JCR journal impact quartiles was presented, as well as the % of total publication output covered by the WoS. The latter amounted to 95% for WIAS and ranged from 84%-100% for the Chair groups, indicating that these analyses were sufficiently representative to be taken into account.

Part B contained the self-evaluations of the 11 chairs groups to be assessed, drafted in line with the format described in SEP appendix D. It provided descriptions of efforts and results over the past six years, plans for the coming six years including strategy, targets, societal relevance, research integrity and data management. Furthermore, each Chair group conducted a SWOT analysis and provided a tailored international benchmark complementary to the bibliometric analysis in part A.

In addition to the ToR, SEP and self-evaluation, the Committee received supplementary documents, including Curricula Vitae of all WIAS staff members, full publication lists of all Chair groups and full text access to each publication, the previous (2009) WIAS Committee report and the last (2012) WIAS Midterm Review report. As background information on the Graduate School policy and procedures, the Committee received a list of WIAS courses and seminars, templates for forms used to lay down or monitor PhD's Training and Supervision Plans, Research Proposals, Midterm Progress etc. Also, copies were provided of the recent (2015) assessment of the University's PhD programme by the EUA panel, the underlying self-evaluation provided to the EUA panel and the WU Board's response to the panel's recommendations.

All documentation was made available 3 weeks prior to the site visit, which turned out to be later than desirable for a thorough preparation of the site visit. Consequently, the Committee needed some more time for reflection during and after the site visit. Therefore, a scheduled meeting with WIAS alumni was cancelled and finalization of this report took a little longer than anticipated.

All in all, the information provided was relevant and of high quality, and the site visit was organized and supported efficiently, for which the Committee compliments the involved staff.

#### **1.5 Working procedure and site visit of the Committee**

Given the extensive documentation, the limited preparation time and diversity of (sub)fields to be covered, a division of tasks between Committee members was applied. In preparation for the evaluation, all members read Part A of the self-evaluation. First responsibility for studying the documentation on the Chair groups in Part B was allocated as shown in Table 1; each Chair group was allocated two 'corresponding' Committee members and each Committee member studied the documentation of at least three Chair groups in more detail.

Prior to the site-visit, all Committee members sent their individual pre-assessments to the secretary. These were compiled and used as input for the closed 'kick-off' meeting.

Apart from one tour around facilities, all interviews, presentations and discussions were attended by all Committee members.

Chair group	Committee member						
	Cannon	Fauconneau	Hall	Lindberg	Ohl	Pineau	Plastow
ABG						x	x
ADP				x	x		
ANU				x			x
AFI		x	x				
APS			x	x			
BHE		x			x		
CBI	x					x	
EZO		x	x				
HAP	x				x		
HMI	x					x	
QVE						x	x

**Table 1)** Division between Committee members of first responsibility for Chair group (pre-)assessments. See section 2.4 for abbreviations Chair groups.

The first draft of each section of chapter 3 of this report was written by the two corresponding members, then edited by the chair and subsequently sent to all Committee members for revision. The secretary wrote the first draft of the general sections of the report, drawing largely from the self-evaluation and material provided by WIAS, after which it was first sent to the chair and subsequently to all other members for revision. The Committee wishes to stress that all subsequent versions of the compiled report were fully supported by all Committee members.

The first draft of the compiled report was presented to the WIAS management for verification of facts and to comment on the findings of the Committee. Factual errors were redressed and the comments were seriously considered and led to some corrections in the final text and/or scores. The final report is endorsed unanimously by the entire Committee.

The site visit took place in the WIAS building at the Wageningen campus from June 22 –26, 2015. The programme (annex 2) included the following components:

- An introduction to Wageningen University and WIAS by the Rector and the WIAS Director, also attended by members of the WIAS board.
- Sessions with each Chair group (leaders and key staff), all starting with a 15-20 minutes presentation, followed by 40-45 minutes for questions & discussion and 10 minutes for internal deliberation.
- Meetings with the general Director of the Animals Sciences Groups, WIAS stakeholders, PhD students and PhD council, and a tour visit of laboratories and facilities.
- A plenary debriefing meeting with the WIAS management and Board, Dean of Sciences and the Rector, also attended by many other WIAS members.

## 1.6 Assessment criteria and Rating

The SEP calls for an evaluation of research units based on three main criteria: Quality, Relevance to society, and Viability. The Committee carefully adhered to the detailed description and interpretation of these criteria that were included in the ToR (and annex 1). Besides a qualitative assessment, the Committee was explicitly instructed to summarize its judgement of the Chair groups on all three criteria in a numerical score on the (new) discrete four-point scale prescribed by the SEP (also explained in the ToR and annex 1). In practice, this turned out to be more difficult than anticipated and gave rise to an extensive discussion with the management of Wageningen University and WIAS. The Committee did adhere to a strict interpretation of the new SEP scale, but not without inclusion of the caveat below.

### **Caveat: remarks on the numerical scoring**

The panel was given two tasks: first, to provide research groups and WIAS management with a (narrative) reflection on their performance over the last six years, which should facilitate future improvement; second, to provide numerical scores for the research quality, societal relevance and viability of each Chair group, using a four point scale provided by the new Dutch SEP. Regarding the latter task the panel understands that the intention of the new SEP is to help ensure genuine, 'non inflated' assessments.

According to the criteria, the highest rank for research quality requires that a research group is '*One of the few most influential research groups in the world in its particular field*'. The panel found that this description provided a useful framing for our discussion.

We inferred from the above description that only very few groups (perhaps less than 10%) in any given review are likely to achieve the top rank, and were strict in judging Chair groups against this expectation. We are concerned, however, that other review panels may have been less strict in their interpretation and that uncritical comparison of scores across reviews will lead to erroneous comparisons of performance, and perhaps unfair decisions as a consequence.

In light of these concerns, the panel urges the management of Wageningen University to either a) carefully benchmark the numerical scoring by the different panels that have assessed WUR graduate schools and normalize them to a common frame, or b) refrain from using these independent scores in any way.

To avoid any doubt, we reiterate that our strict application of the assessment frame has resulted in relatively few '1'-scores for WIAS. This fact is not to be misinterpreted as a negative assessment. On the contrary, ***the large number of '2'-scores is to be understood as a very good result indeed.***

Finally, we feel it appropriate to remark on an obvious disadvantage of a discrete four-point scale for assessment. This is the impossibility to distinguish rather subtle differences between groups, thus increasing the likelihood of seemingly uniform assessments. Especially for a heterogeneous, and rather descriptive assessment category such as 'societal relevance', evaluation of different factors may lead ultimately to one and the same numerical score.

## 2. Structure, organisation and mission of WIAS

### 2.1 Introduction

The Wageningen Institute of Animal Sciences (WIAS) is one of six graduate schools of Wageningen University. WIAS provides training for young researchers and is engaged in fundamental and strategic research in animal sciences and related fields. The core of WIAS' activities is its PhD programme, which is embedded in an environment of cutting-edge research.

WIAS was formally established on May 25, 1993, and in April 2015, the school was comprised of 205 registered PhD candidates, 18 postdocs and 85 admitted staff members.

### 2.2 Mission and Ambitions of the Graduate School

The ambition of WIAS is to be at the international forefront of Animal and Zoological Sciences, via fundamental, strategic, and societal relevant research and PhD training, operating according its mission: *"Improving our understanding of animals and their various roles for mankind through fundamental and strategic research and training of early stage researchers"*.

The research of WIAS encompasses the life-science fields of zoology, genetics, immunology, epidemiology, physiology, nutrition, ecology and fisheries.

The tasks of WIAS are to:

1. To develop and facilitate education and training of PhD candidates;
2. To safeguard, monitor and improve the quality of academic research and supervision;
3. Stimulate the development of a coherent academic research programme, with accompanying strategic research plans;
4. To stimulate internal and external collaboration;
5. To stimulate talent development

As all other graduate schools, WIAS advises the Executive Board of Wageningen UR on the appointment of new full professors, and on strategic plans of Wageningen UR.

### 2.3 A coherent research and PhD training programme

The research of the Chair groups in WIAS covers broad themes, such as, 'Animal health and welfare', 'Sustainable systems' and 'Understanding how animals function'. WIAS also wants to contribute to the development and implementation of strategic research priorities of Wageningen UR, with a particular focus on Wageningen UR's new strategic research priorities, such as:

- One Health
- Resilience
- Resource Use Efficiency

WIAS develops its research and PhD training programme, among other things via strategic internal and external collaboration. Chair groups established structural internal collaboration within the clusters of Chair groups in the Department of Animal Sciences and/or via specialized expertise centres together with counterparts at the DLO Institutes.

Within the Netherlands, long-standing collaboration exists with the Veterinary Faculty (University of Utrecht), The National Institute for Public Health and the Environment (RIVM), the Netherlands Institute of Ecology (NIOO), GD-Animal Health, and many other Dutch universities and research institutes. Large public-private partnerships were established with clusters from industry in the domain of animal nutrition (Feed4foodure), animal breeding (Breed4Food) and with the Top Institute for Food and Nutrition (TIFN).

A main goal for seeking international collaboration is to develop joint courses and/or to explore the feasibility of establishing joint doctorate programmes. WIAS also established strong linkages with the

National Institute for Agricultural Research (INRA; France), and the CGIAR Institutes, International Livestock Research Institute (ILRI; Kenya) and World Fish (Malaysia). A joint doctorate with a number of European Universities has been established via the European Graduate School in Animal Breeding and Genomics (EGS-ABG), which was recognized by the EU as an Erasmus Mundus Joint Doctorate Programme.

## 2.4 Management and organisation

In 1999, Wageningen University merged with the (now ten) applied research centres of the foundation “DLO”. The combined Wageningen University and Contract Research Organisation (CRO) are referred to as Wageningen University and Research Centre (Wageningen UR, with one Executive Board). University and CRO staff collaborate closely in five so called Science Groups, each group comprising 1 University department and 1-2 CRO units. WIAS is part of the Animal Sciences Group (ASG), where cross disciplinary discussion and strategic cooperation takes place, mainly with Livestock Research, the Central Veterinary Institute and the marine research institute IMARES. Collaboration among Chair groups within the department of Animal Sciences is further stimulated in three Clusters:

1. *Biology and Aquatic Resilience*
2. *Epidemiology, Genomics and Interactomics*
3. *Adaptive Animals and Systems*

WIAS encompasses the research of 12 Chair groups of Wageningen University, one also participating in the Plant Sciences Group, which is why it was not included in this assessment. Intensive cooperation exists with other graduate schools of Wageningen University and with various national and international partners. The organisational structure of WIAS is shown in Figure 1.

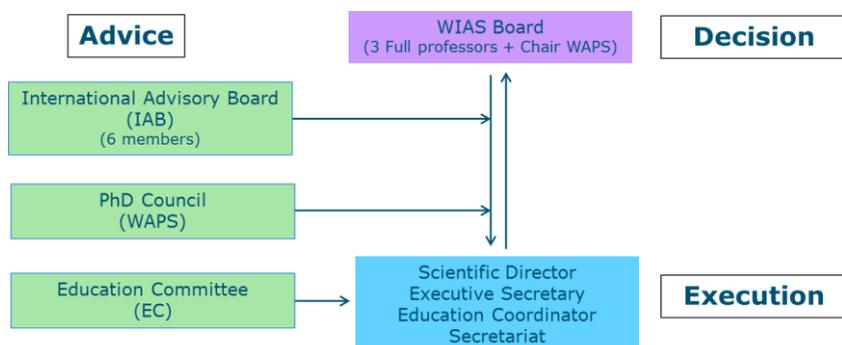


Figure 1. Organisational structure of WIAS

**WIAS Board:** The WIAS Board makes strategic decisions with respect to the research and postgraduate education programme. These decisions are based on advice of the International Advisory Board, the Education Committee, and the WIAS-associated PhD Council. The WIAS Board also advises the WU Board and Research Centre on the appointment of the new scientific director. The WIAS Board consists of 4 members: 3 Professors and the chairman of the WIAS PhD council.

**Scientific Director and Executive staff:** The scientific director is responsible for the operation and performance of the graduate school, and is appointed for 4 years. The current director has an appointment of 0.3 FTE. The director is supported by an executive staff consisting of an executive secretary (1 FTE), an education coordinator (0.5 FTE) and administrative support (0.5 FTE).

**International Advisory Board (IAB):** The IAB advises the board and scientific director on research and education programmes and policies. The IAB consists of five world-wide renowned scientists in the domain of WIAS.

*Education Committee (EC):* The EC advises the board and the scientific director on the content and format of the training and supervision plan (TSP) and on the WIAS education programme in general. The Committee evaluates all PhD courses and gives input and advice concerning PhD education within WIAS. The 6-member EC consists of 3 staff members and 3 PhD candidates.

*WIAS-associated PhD (WAPS) Council:* The WAPS council consists of 8 members and has an advisory function to the WIAS Board and the scientific director on all aspects of the PhD programme. WAPS organizes course surveys on a regular basis. The PhD candidates also organize the annual WIAS Science Day.

An overview of the WIAS Chair groups:

*Table 1. WIAS Chair groups and their chair holders.*

<b>Animal Sciences group</b>	
<u>Chair group</u>	<u>Chair holder</u>
Adaptation Physiology (ADP)	Prof. Bas Kemp
Animal Breeding and Genetics (ABG)	Prof. Johan van Arendonk
Animal Nutrition (ANU)	Prof. Wouter Hendriks
Animal Production Systems (APS)	Prof. Imke de Boer
Aquaculture and Fisheries (AFI)	Prof. Johan Verreth
Behavioural Ecology <sup>1</sup> (BHE)	Prof. Marc Naguib
Cell Biology and Immunology (CBI)	Prof. Huub Savelkoul
Experimental Zoology (EZO)	Prof. Johan van Leeuwen
Host-Microbe Interactomics <sup>2</sup> (HMI)	Prof. Jerry Wells
Human and Animal Physiology <sup>2</sup> (HAP)	Prof. Jaap Keijer
Quantitative Veterinary Epidemiology (QVE)	Prof. Mart de Jong
<b>Plant Sciences group</b>	
<u>Chair group</u>	<u>Chair holder</u>
Farm Technology <sup>1</sup>	Prof. Peter Groot Koerkamp

<sup>1</sup> Behavioural Ecology and Farm Technology participate within the graduate schools WIAS and PE&RC. Behavioural Ecology will be assessed within the WIAS; Farm Technology will be assessed within the PE&RC.

<sup>2</sup> Host-Microbe Interactomics and Human and Animal Physiology participate within the graduate schools WIAS and VLAG. Both are assessed with WIAS.

### 3 Performance of the Graduate School WIAS and its Chair groups

#### 3.1 General remarks

First of all, the Committee wishes to express its appreciation for the high level of enthusiasm and the positive, academic atmosphere experienced throughout its stay at the impressive Wageningen campus. However, it is perhaps pertinent to offer some general recommendations, based on the experiences of members of the Committee that may help improve a next evaluation process even further.

The documentation provided by WIAS was comprehensive and generally adequate for the evaluation purposes. It would have been appreciated if the documents had been available rather earlier than happened, since the Committee members have many commitments and therefore limited time slots available for study. It would also have been appreciated if the publication lists had been standardised and sorted such that articles with senior authors within the Chair group were listed together and articles with other senior authors listed separately.

Very significant effort was placed on bibliometric evaluations of the Chair groups. There are numerous indicators that can be extracted and their usefulness as a measure of quality is a source of debate. For example, first or last authorship was not taken into account. Very high impact journals can be criticised for publishing trendy rather than solid science. Considerable care is therefore needed in interpreting bibliometric data and these parameters were therefore used in moderation by the Committee. Similarly, it was not always evident that the benchmarking was against the absolute leading international groups, primarily because the definition of a scientific field and its scope was not easily identified.

There was considerable variation in the responses of the Chair groups to the comments from the previous evaluations. In some cases, these were ignored, in others detailed responses were given. Perhaps the instructions could be clearer here. Also, the quality of the SWOT analyses varied considerably; it may be possible to assist the groups with this activity.

It was somewhat difficult to evaluate the rather complex organisation with the intermediate level of Clusters; the benefit of this extra level of organisation was less than apparent for several Chair groups, although this may be a question of time for this level to become useful.

The Committee wishes also here to emphasise the importance of recruiting from a broad base, both concerning graduate students and, even more importantly, those talented young researchers who come into the tenure-track process. Advertising on the homepage can hardly be seen as satisfactory and international advertising in major journals is strongly recommended, even though it involves extra effort in the selection process. The process can give the selected candidates, whether or not they are local, significant extra self-confidence and visibility.

### 3.2 Graduate School WIAS

**University:** Wageningen University  
**Graduate school:** WIAS

#### ***The research environment for the PhD programme***

All evidence suggests that WIAS is well managed and that the matrix structure, which links the department (ASG) and the school (WIAS), has been implemented effectively to produce a coherent research environment. We were impressed by the collegiality of the staff and the level of collaboration among Chair Groups, either through engagement as part of a cluster or through centres.

Perhaps the most strategic decision available to the school for realising ASG's ambition for world leadership in animal husbandry is the hiring decisions it makes. The panel encourages management of both ASG and WIAS to agree a recruitment strategy that will see the skills profile evolve to meet the expressed ambitions. It should also take care to ensure that recruitment does not draw too much from home-grown high potential individuals.

As far as we are able to determine, the school's financial circumstances seem sound, although cost pressures to support infrastructure and animal experiments are certain to continue to increase and will require close attention. This aspect should be taken into consideration within the strategic planning. Interaction between the scientific staff to support their possibility to be awarded personal research grants (NWO, ERC) is noticeable. Overall, we have no major concerns about the viability of the school.

#### ***PhD training and education programme***

The school is to be commended for the open and supportive environment that it offers for PhD students and the excellent facilities that are available. The fact that graduation rates and quality are among the best in the University is also notable and is a testament to the quality of the monitoring and efficiency of the program. The panel was impressed by the range of courses offered to graduate students, the value students placed on these, and the efforts chair groups were making to innovate in this area.

One area that deserves further consideration concerns the competence of students to contextualize their research within broader societal issues and debates. This is important for future leaders in all fields of animal research; we encourage the school to find ways to build this competence in their students. There also seemed to be a relative lack of awareness of the mission and vision of WIAS and their alignment with those of ASG.

Two other aspects that require careful monitoring in terms of optimising or maintaining performance are student/supervisor ratio and the length of time to graduation. These seemed to have improved at this point although the data on the latter are relatively scarce. During the period, the number of PhDs who have not graduated by year 7 has increased (7% for those started in 2006, 23% for 2008). This trend is a concern and it should be monitored and addressed, so that the length of time to graduation could be kept within 4 to 4.5 years.

Concerning graduate employment, we note the low proportion of unemployed graduates, which is commendable, but we feel unable to judge the broader employment record. WIAS' successful 'Talent & Topics' course appears to prepare young and ambitious scientists well for a career in academia, explaining why it has been adopted as a university-wide programme since 2012.

#### ***Integrity***

We appreciate the efforts that the school has made to highlight the importance of research integrity in all its dimensions.

#### ***Conclusion***

We conclude that WIAS meets the following conditions:

- The graduate school provides a well-organized, coherent and productive research environment for the PhD programme.
- The graduate school offers a sound and institutionalised programme in which PhD candidates are trained to become independent researchers
- The graduate school functions as an independent organisational unit with its own budgetary and managerial responsibility, with the university or universities involved providing a level of financing for a period of at least six years that can be described as sufficient in view of the graduate school's planned capacity

### ***Recommendations***

Obviously, PhD students are most familiar with the objectives and mission of the chair group they belong to. There may be benefits, however, in doing more to connect graduates to the ASG and WIAS objectives and mission, and to make more visible how chair groups relate to this.

We commend ASG and WIAS for those efforts they have made to encourage appointments of external students and staff members through global search and open competition. There are excellent examples of funded initiatives e.g. NWO Graduate program, EBS-ABG and Marie-Curie awards; efforts should be made to continue or to replace these as they finish. The panel wishes to emphasize the importance of maintaining this approach, even when internal high potentials have already been identified.

WIAS should be diligent about monitoring metrics such as the student-supervisor ratio and completion time/rates and taking action to ensure good performance.

Since the school and research institute vitally depend on the performance of animal experiments and focus their primary mission on animal husbandry, it seems appropriate to take on explicit ethical statements on animal use in general and on the 3R in the context of animal experimentation.

A very important aspect of WIAS' strong position is its impressive animal facilities and access to other animal resources (through partnerships). Developing a strategy to maintain this position in the face of increasing costs is required.

### 3.3 Chair groups WIAS

<b>University:</b>	<b>Wageningen University</b>
<b>Graduate School:</b>	<b>WIAS</b>
<b>Research Group:</b>	<b>Adaptation Physiology (ADP)</b>
<b>Research input tenured staff 2014:</b>	<b>3.9 fte</b>

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>2</b>

#### ***Motivation scores***

Adaptation Physiology is a well-established research group. It is appreciated that the group leader and his scientific staff succeed in not only keeping a high scientific standard, but also in creating a stimulating and positive working environment for students and young researchers. The group has a clear, though relatively broad, research line that aims at understanding what determines an animal's capacity to cope with the challenges imposed by productivity-directed living conditions. The conceptual framework that forms the primary driver for the group, however, could be made more explicit. This also might help to make more transparent the complementary value that forms quite natural links with those other chair-groups within ASG/WIAS that together form a cluster, both in terms of teaching and research. The contribution of the group Adaptation Physiology to the Animal Welfare Centre, that is currently being developed within WUR, and the add-on value of that Centre for the research groups is assessed positively by the group itself, but remains to be developed.

#### ***Research quality***

Overall, ADP has a good publication record in high quality journals, and with high citation per publication. Papers are being published in various ISI-fields; the RI therefore is of limited assessment value for this group. However, ADP has a high forward citation when compared with benchmark peer groups (INRA Pegase, Rennes, France & Dept. Animal Science, Aarhus Univ., Denmark). It deserves appreciation that PhD-students regularly receive prizes for posters and/or oral presentations at conferences. Further, ADP has a very good international visibility, and hosts a considerable number of PhD-students and visiting fellows from various countries. Overall, the group's research quality is assessed as very good.

#### ***Relevance to society***

The group has a very good outreach to societal target groups. While 2014 shows a lower number of lectures for stakeholders etc., the overall number of workshops and seminars for a variety of stakeholder groups is significant and, moreover, is being perceived by the group members as an important line of activity. Given its interdisciplinary expertise, the group is very well equipped for such societal outreach. This, again, could perhaps be made more explicit as part of the conceptual working frame of ADP.

#### ***Viability***

ADP is well equipped and has demonstrated a consistent performance following its expansion with two staff members in 2010. Therefore, the group's viability is assessed as very good. Costs for animal experiments and reduced ministry involvement in the research agenda are likely to induce increasing pressure on the group's financial burden to perform research that vitally depends on expensive housing and care of [large] animals. On the other hand, the group's very good reputation facilitates teaming up with other chair-groups to share facilities and methods and, thus, some financial burden. The political/societal relevance of the chair-group activities will remain highly relevant in the future.

#### ***Other remarks***

It is appreciated that the chair-holder emphasises, as part of the group's strategy, the creation of a working environment that is not only creative and of high quality, but is also collegial and balanced. Such aspects help optimally develop professional and personal integrity in research. Again, we suggest making

the group's competence and concepts more visible, for example by outlining the group's work and approach to ethics of animal use.

***Recommendations***

It may seem difficult to maintain a high level of output and expertise for core activities in all the various areas (6 areas), and with the number of FTE of senior staff available for research (3.9 in 2014). It may help explicitly to formulate an integrated concept underlying the research strategy and work priorities of the chair group. This may make it easier to identify the group's main targets for the next 6-year period.

**University:** Wageningen University  
**Graduate School:** WIAS  
**Research Group:** Animal Breeding and Genetics (ABG)  
**Research input tenured staff 2014:** 4.1

<b>Score</b>	<b>Research quality</b>	<b>1</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>2</b>

### ***Motivation scores***

Animal Breeding and Genetics has established itself as a world-leader in its field by building strength across its three domains: quantitative genetics, genomics and breeding programmes. It has also built further strength through collaboration within WIAS, as well as the Centre (ABGC) and the EGS-ABG (which includes international collaboration). This approach has undoubtedly contributed to a stimulating and nurturing working environment for students and young researchers. The partnership Breed4Food with the Dutch breeding companies (cattle, poultry and pigs (2)) is a strength in terms of research (access to samples and data, as well as input on needs and opportunities) and funding support. However, the group also works beyond this core group of industry partners when it adds value. These interactions are managed pro-actively with transparency and significant outcomes for all industry. The chair-group has a clear focus for the future in biology- (function)-driven genomic predictions.

### ***Research quality***

There is an excellent mix of fundamental and strategic research. AGB has a clear vision, mission and focused objectives with staff aligned to deliver the required performance. Bibliometric scores show progress (weighted average IF increased to 3.2) or maintain a good standard (RI ave 1.83). Benchmarking supports AGB being an internationally leading group.

### ***Relevance to society***

The group's vision and mission are well aligned with societal developments and future needs. Outreach towards industry is excellent. Interaction with wider society is also very good, e.g. role with the Council of Animal Affairs. However, considering the quality of research and the impact being made, even more attention might be paid to making their research accessible for the general public. ABG is also well connected to researchers in the developing world (including funding from BMGF for developing a road map for poultry breeding).

### ***Viability***

Output metrics have been maintained or improved. Major collaborations (including those with industry) and significant research initiatives/funding, as well as infrastructure (HPC cluster, ABGC) and access to genetic and phenotypic resources (through industry and collaboration) point towards very good viability. The EGS-ABG has been very successful but is coming to an end so that alternative options are needed (e.g. to help maintain output of quality PhDs).

Although the group is composed of excellent (senior) professionals, the upcoming departure of the current group leader may develop into a threat for the viability of the group in its current, well-integrated form. See also our first recommendation below.

### ***Other remarks***

The Chair is commended for the organization of the review presentation and the team-work in relation to the next 6 months before his departure.

The PhDs/Scientific Staff ratio should be kept at an appropriate level, so that PhDs can benefit from the best possible degree of supervision.

**Recommendations**

Develop strategic plan to move ABG to #1 in its field within next 6 years including recruiting a new Chair, improving attractiveness to “top-ranking talent” and addressing gender balance.

Work closely with industry partners to develop a sustainability plan for the Centre ABGC including optimizing industry support and maintaining outward-facing collaboration.

Increase focus on international collaboration through large research initiatives (e.g. FAANG) to help overcome some of the identified threats and deliver improved knowledge of genetics and interactions. This should consider alternatives to replace EGS-ABG.

Continue focus on development of data storage and analytical capability to ensure remaining ahead of needs. Remain innovative in the field of data mining, data reconciliation strategies through collaborating with statisticians and mathematicians.

Consider developing a broader communication strategy including the general public. Continue to identify associated training opportunities/needs such as “social awareness/impact” (planned course autumn 2015).

<b>University:</b>	<b>Wageningen University</b>
<b>Graduate School:</b>	<b>WIAS</b>
<b>Research Group:</b>	<b>Animal Nutrition (ANU)</b>
<b>Research input tenured staff 2014:</b>	<b>3.9 fte</b>

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>2</b>

### ***Motivation scores***

Animal Nutrition is a well-established research group. It is appreciated that the group leader and his scientific staff succeed in not only keeping a high scientific standard, but also in creating a stimulating and positive working environment for students and young researchers. The group has a clear and broad research line that aims at understanding the flows and utilization of nutrients in animals, including the impact on the environment. The conceptual framework that forms the primary driver for the group is to increase knowledge on the impact of nutrition on performance and health, although the research focus varies over time. The accumulated knowledge is integrated in models of nutrient utilization that can be applied both for feed evaluation purposes and environmental impact.

### ***Research quality***

Overall, ANU has a high publication record in high quality journals, and with high citation per publication. ANU has a high forward citation when compared with benchmark peer groups (Univ. of California, Davis, USA; Univ. of Illinois, Urbana Champaign, USA; Aarhus Univ., Denmark). ANU has a high publication record of conference papers.

### ***Relevance to society***

In general, there is a high output for societal target groups and good connection to industry, including companion animal nutrition. ANU staff members frequently participate in committees and civil advisory bodies.

### ***Viability***

In general, ANU is well equipped and has high viability. Focus towards increased funding of industry priorities in the Netherlands is favourable for ANU. Costs for animal experiments could be a threat to further development of the research. However, the group has very good and well-developed co-operation with industry which should make it possible to deal with and overcome these threats.

The group has created synergy with other Chair groups (HMI, ABG...), as well as with WLR and UU, which adds to its strength. The group flagged a risk from a perceived conflict of interest with respect to increasing interaction with its industry partners.

### ***Other remarks***

It will be important to maintain the balance between "Academic freedom" in setting the research agenda and publishing results, and the dependence on (demands from) industry, in order not to jeopardize the credibility of the research.

### ***Recommendations***

The cost of animal research is a threat and the group is encouraged to work with the University and its industry partners to build a sustainability plan (possibly with 5 year horizons).

Societal impact is high; however, despite high relevance to general public concerns (sustainability, antimicrobial resistance), publications for the general public appear to be low (average <1). Track/report actual activity or widen efforts to address this gap.

Continue to focus on integrating different strengths (in silico, in vivo and in vitro) to address priority issues.

Develop a succession plan as part of overall group development (external/internal recruitment and further training of staff/alumni).

Identify and implement pro-active approaches for the perceived (and any future actual) conflicts of interest arising from the close connection with industry. These should extend to all relevant sectors of society in order to prevent reactive fire-fighting.

<b>University:</b>	<b>Wageningen University</b>
<b>Graduate School:</b>	<b>WIAS</b>
<b>Research Group:</b>	<b>Animal Production Systems (APS)</b>
<b>Research input tenured staff 2014:</b>	<b>1.2 fte</b>

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>2</b>

### ***Motivation scores***

Animal Production Systems is an established research group with a new head of the chair group since September 2011. It is appreciated that the group leader and her scientific staff have succeeded in keeping a high scientific standard, and also in creating a stimulating and positive working environment for students and young researchers. The group has a clear research line that focuses on exploring the multi-dimensional consequences of innovations in livestock systems across the world. The triangle formed by environment, animal welfare and livelihood, which frames the respective innovation context forms the primary driver for the group's research. While this driver or objective is being made nicely explicit, the conceptual basis of the triangle's dimensions might profit from somewhat elaborated description and definition.

### ***Research quality***

Overall, APS has a moderate to high publication record in high quality journals, and with high citation per publication. APS has a high forward citation when compared with benchmark peer groups in Germany (Univ. of Hohenheim), but lower when compared with benchmark groups in Denmark (Aarhus Univ.). APS has a moderate to high publication record of conference papers.

### ***Relevance to society***

This is an increasingly important societal topic and the group is clearly providing knowledge products that are of considerable value. Connectivity to industry, retailers and international agencies is strong and the tools and insights APS provides are helping to evaluate scenarios for sustainable development at both national and global levels. Stakeholders expressed particular appreciation for recent efforts to explore mitigation of the environmental impact from livestock production, with emphasis on greenhouse gases.

### ***Viability***

In general, APS is well equipped and has high viability. Care should be taken, however, not to place too much emphasis on research to support immediate political needs. This may result in short-term impacts at the expense of more fundamental research and model development. We also note the great need and potential for work to build research capacity in developing countries for addressing the issues APS focuses upon.

### ***Other remarks***

The critical mass of academic staff is low but will be markedly increased by investment in a new tenure track position, a personal associate professor and special chairs. This is welcome.

### ***Recommendations***

Be explicit and consistent about the conceptual basis and scientific concepts that form the cornerstones of your primary objective.

Equalising entirely different entities like health and behaviour weakens the impression of an otherwise strong approach. Consider involving ADP and/or BHE especially in welfare-oriented research.

**University:** Wageningen University  
**Graduate School:** WIAS  
**Research Group:** Aquaculture and Fisheries (AFI)  
**Research input tenured staff:** 2.1 FTE

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>3</b>

### ***Motivation scores***

This is a strong group but with a very broad research agenda. Further efforts to focus the research effort would appear to be the single most important action to strengthen performance in all areas.

### ***Research quality***

Overall, AFI is clearly a group that is delivering a steady output with a quality and research impact that is on a par with comparable research groups elsewhere in both aquaculture and fisheries. Perhaps because the group focusses on a rather wide range of topics across both the fisheries and aquaculture domains, it would be hard to argue that AFI as a whole has built a body of research that would make the case for a category 1 score as “one of the few most influential groups in the world in its particular field”.

In aquaculture, the group has a specific and unique contribution at world level on innovative concepts in fish nutrition and integrative research on aquaculture systems. This is complemented by relevant research in social sciences for policies, regulations and certification. The group also has a specific and relevant contribution to teaching in this field.

Concerning fisheries, there is a question about the extent to which faculty members are themselves providing the academic leadership to the work, as opposed to colleagues in IMARES and other institutions. This leads to the question of whether the group truly has a comparative advantage in the fisheries domain.

### ***Relevance to society***

Given the anticipated growth of the aquaculture sector in the coming years, advancing our understanding of fish feed and nutrition and developing aquaculture systems in various environments are clear societal imperatives. Research in this area offers obvious opportunities to, among others enhance aquaculture productivity, animal health, and the nutritional value of fish for consumers. The publication record of the group, the excellence of infrastructure, the securing of an industry-secured position and the development of certification of aquatic products are indicators of the track record of delivery and continuing demand for work of this kind. The efforts to engage in practical research on tropical aquaculture systems, to further explore these issues, is commendable.

The relevance to society of the research undertaken on fisheries is somewhat less clear. This is partly because the work in this area appears somewhat scattered, both geographically and thematically. However, it is also rather difficult to see the contribution of the research from the group and some of the outreach activities, e.g. tuna traceability and coastal rehabilitation in Indonesia. We also note from our discussions with the group that their research agenda is not really shaped by discussion with colleagues at IMARES, which rather limits its potential to add value.

### ***Viability***

It would be hard to argue that AFI is not viable, but we question whether the envisioned strategic positioning of AFI is the most suitable for the future.

Although there is an exchange of ideas within the group, there is not really a convergence between the two fields in aquaculture and fisheries or in the development of common concepts or approaches. This

results in an apparent fragmentation of the research agenda. The previous review recommended that the group became more focused, but the response to this appears to have been partial. Some areas, such as the feed and nutrition work have certainly strengthened, but the panel found little evidence that the group wants to focus by stopping certain kinds of work. The appointment of a chair in Marine Animal Ecology offers an opportunity to rethink how the groups might be configured (see recommendations).

### ***Recommendations***

Options for strengthening the in-house capacity in marine fisheries research in close connection with IMARES should be considered. This would be in line the WUR strategic intent to enhance marine research. The appointment of a new chair in MAE appears to offer a clear opportunity to address this specific strategy (see below).

Further thought should be given to how the research foci of AFI and MAE might evolve in the future and how this provides an opportunity to increase focus and coherence. Re-focusing AFI on aquaculture, with eventual links to the nutrition groups within WIAS and positioning MAE to include marine fisheries, with links to IMARES and others relevant research groups (NIOO and others) would appear to be a compelling option. This, of course, leaves the question of freshwater fisheries research, which could perhaps be considered a legacy research area that should decline over time. Similarly, it is hard not to see the research on coral reefs and sponges as an outlier that would, perhaps, be better accommodated in a different research group within the university.

Consideration should be given to restricting future applied development work in tropical countries to the core areas of interest in aquaculture. Maintaining the quality of engagement with and supervision of students working overseas is often a challenge. Restricting focus to areas of obvious strength and critical mass may help to overcome this difficulty. It would also help limit further fragmentation that can come from opportunistic grant seeking.

<b>University:</b>	<b>Wageningen University</b>
<b>Graduate School:</b>	<b>WIAS</b>
<b>Research Group:</b>	<b>Behavioural Ecology (BHE)</b>
<b>Research input tenured staff 2014:</b>	<b>1.9 fte</b>

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>3</b>

***Motivations for scores (2 page max.):***

**Overview :**

Behavioural Ecology (BHE) was established as a chair group in 2012. It is a fairly small group that has already developed a solid contribution to the organisation's teaching programme (BSc to graduate level), resulting in healthy basic funding and high potential for recruiting high potential students within WIAS. The group's research approach is directed at individual behaviour and social organisation, with the ambitious aim to cover both fundamental research in wild animals and applied research in farmed population of birds.

**Research quality**

Assessment of this small chair group suffers somewhat from the fact that the group follows two relatively distinct research lines, one matching the core expertise of the chair holder, the other being based on the expertise of one of the assistant professors. The research quality of the fundamental behavioural ecology research line that is being led by the chair holder is very good and (inter)nationally recognised. The second research line, being directed at applied aspects of behaviour in farmed birds, also has a good to very good standing and quality within this research area.

While the group does set out to explain that the two research lines can be complementary, a fully integrated approach that may form a unique selling point for the group has not (yet) been developed. Currently, the primary link between the research lines appears to be the transfer of technical and experimental approaches, rather than on a conceptual basis.

Finally, approximately 0.4 fte of this group's research staff seems to be allocated to a third, less structural line on companion animals, which is difficult to relate to the other two research lines.

All this makes assessment and benchmarking of (and for) this group difficult.

Given the short time period since the start of this group, it is appreciated that quite some efforts have been taken by the chair holder and staff to establish complementary research activities, as well as an attractive teaching portfolio. However, the commission wishes to express some concern about the fact that the tenured staff of this very small group is scattered across different research lines and, therefore, may find it difficult to 'join forces'.

**Relevance to society**

Again, there are two lines of societal outreach: the fundamental behavioural ecology is apt to trigger interest in the broader public as part of a general interest in 'nature', while research in laying hens is of potential interest to more specific stakeholders. Further, the expertise activities in the companion animal area are, of course, of high public interest by default. Although it may be difficult to imagine how external parties could be able to link these activities, or understand crosslinks between them, all activities of the chair group are of relevance to society.

**Viability**

The group succeeded in generating sufficient teaching income to approximately cover the costs of tenured staff. Further development and strengthening of research activities, however, are dependent on generating additional funding; thus it is still a gamble on the future. The group has started to integrate

research and teaching networks (including EU networks) that will certainly help to concretise its growing scenario.

It is accepted that viability of a research group within the discipline of Behavioural Ecology may be safeguarded based on a relatively small critical mass. Still, the combination of a very limited group size with different research lines and expertise will need to demonstrate its viability during the upcoming period.

### ***Recommendations***

This group surely deserves the room and time to allow for establishing and developing further. Nonetheless, the commission suggests not to task the group of Behavioural Ecology with embracing all aspects of 'behavioural research'; while there are, of course, common aspects between different fields of behavioural research, there do exist relatively discrete fields, and it might be difficult to establish research excellence across more than one such field.

The commission considers it advisable structurally to increase strength on the basis of the primary research line and to develop a shared conceptual approach, which might still cover both fundamental and applied research activities. This process would profit from the appointment of an associate professor, which is therefore strongly recommended.

<b>University:</b>	<b>Wageningen University</b>
<b>Graduate School:</b>	<b>WIAS</b>
<b>Research Group:</b>	<b>Cell Biology and Immunology (CBI)</b>
<b>Research input tenured staff 2014:</b>	<b>1.8</b>

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>2</b>

### ***Motivation scores***

The CBI chair group has focused during the preceding period on immunological problems, notably immune competence, with three areas of research, i) mucosal immunology and immunomodulation through diet to develop protection against allergies, ii) biomarkers for natural disease resistance and iii) vaccine development for aquatic veterinary species through oral delivery. The group is very productive and the productivity has increased markedly since the previous review, with significant increases in the impact of publications, as judged by bibliometric indicators. Since the last review, there have been a number of important staff changes, with retirements allowing recruitment of new persons, which has helped adjust the gender balance. Several potentially interesting research lines have been discontinued to maintain focus on primary goals. Expansion of the research tools to include zebrafish has been a positive development. Both the fundamental and applied aspects of the research topics are well funded from national and EU sources and the infrastructure is excellent. Collaborations with colleagues in WIAS have increased during the present review period.

### ***Research quality***

The group is clearly internationally recognised, as evidenced by conference invitations, editorial board participations etc. As noted, publication quantity has increased, as have the bibliometric indications of impact. Studies on the zebrafish immune system have provided fundamental information to allow development of this model for use in the focused studies of the group. Research in the area of allergy in human, including neonatal, health has led to collaborations with industry. Although numerous convincing results, obtained on a broad spectrum of animal species, were presented, the group could benefit from an internal cost/benefit assessment of a strategy with multiple species. In-depth, long lasting investigations with a suitable, lower number of models might also be considered a rewarding strategy to further develop the international recognition of the group.

### ***Relevance to society***

The group holds several patents relating to immunomodulation. They have provided data sets to colleagues and have contributed to lay press. They have provided access to spf-zebrafish breeding and have shared pathogen-free fish with colleagues. The group collaborates with patient organisations, and organises a very successful, yearly international course on fish immunology.

### ***Viability***

The viability of the group appears very good. New recruitment has extended the areas of research covered without dilution of the focus areas. The facilities that are available are excellent. The number of PhD candidates remains at a healthy level. Although only three key initiatives were presented, each of them is a multi-topic item. These topics are probably not of equal strategic relevance for the future of the chair group, so that some degree of prioritization could be beneficial to the future impact of the research of this group.

### ***Recommendations***

There is focused expertise in the group that allows good progress to be made. Their research has high societal relevance, as well as some important fundamental significance. Among funding opportunities, the chair-group should prioritize those that fit adequately with their primary research goals to be able to concentrate on them.

<b>University:</b>	<b>Wageningen University</b>
<b>Graduate School:</b>	<b>WIAS</b>
<b>Research Group:</b>	<b>Experimental Zoology (EZO)</b>
<b>Research input tenured staff:</b>	<b>0.9 FTE</b>

<b>Score</b>	<b>Research quality</b>	<b>1</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>2</b>

### ***Motivation scores***

This group is amongst the world-leading groups on animal biomechanics and functions. They have a specific niche that could be considered at the frontiers of animal science. Their fundamental research has produced original knowledge on model animals but also on other animals for which they found direct application in agriculture (bees), human health (mosquitos) and animal health (cows). They have started to successfully develop an applied technological research agenda at the frontier of biology and engineering on bio-inspired solutions for animal and human health. The group is well integrated in WIAS research and teaching, especially within the Biology & Aquatic Resilience cluster with AFI and CBI. Overall, they have a very clear and relevant strategy both for research and teaching, so that the group could be considered as sustainable.

### ***Quality of research***

The group has published numerous papers with high impact factors during the last few years, which significantly improved their research impact. They have also had a lot of success on competitive grants and have started to submit grant applications at the European level (ERC). They have built international collaborations mainly with the USA with the best fundamental (UCR, Washington ...) and technological (Caltech, Fresno, ...) groups in the world. From their recent research performance, the group is to be considered as one of the leading groups in the world in biomechanics of swimming and flight.

The recommendation of the previous assessment to go deeper into molecular mechanisms has been followed by developing relevant collaborations with other groups at Wageningen University and the Hubrecht Institute (Utrecht, NL), thus adopting a safe strategy for the group by concentrating on their scientific expertise.

### ***Relevance to society***

The research on the bio-fluid dynamics of swimming and flight have their own relevance in terms of knowledge production and the group has had a fruitful collaboration with livestock research and the dairy industry for which they proposed original solutions for both mastitis and claw diseases (two patents). The recently started research on bees and mosquitoes in collaboration with other relevant groups of Wageningen University (entomology, resource ecology, plant research), which will have direct applications for agriculture and human health (mosquitoes), is especially exciting and has high potential for impact.

The group has also started a new prospective field of technological research on bio-inspired solutions for which they have started fruitful collaboration with numerous technical Universities and groups in the world. However, the visibility and the outputs of the group in the development of unmanned micro-air or underwater vehicles are unclear.

The group won the national academic outreach competition (Academic year prize) in 2010 on the basis of their expertise in biomechanics of animal flight. This led to considerable media attention that reflects very well on the group.

**Viability**

The group is relatively small but is expected to remain stable during the next term. The scientific staff and the PhD/staff ratio will be maintained by relevant personnel and through open grants. There is an ambition to expand the group in a measured way with selection of high quality PhD students - a commendable strategy. The external funding percentage is expected to increase but with competitive grants rather than industry funding (although there is some).

**Other remarks**

The group has had to develop its own facilities for computing and data storage, due to the financial difficulties with access to University and other external facilities. If this proves to be a limitation for the group, it should be taken up by the School's management.

**Recommendations**

The group is encouraged to maintain its leadership position and explore options for further strengthening its expertise and maintaining its current research quality. The group should be careful, however, to reinforce its current research line and its position in the current project on mosquitoes and bees, and take care to maintain a focused research agenda.

We encourage the group to think about how it might enhance its visibility in ways that might attract students of varied disciplines (biology, technology ...). This might be achieved, not only through teaching, but also through a deliberate strategy for promoting research results through new media channels that are accessed by the target demographic (e.g. YouTube etc).

The development of new technological research on bio-inspired design has considerable commercial potential. The group is encouraged to maintain its approach to innovation and partnership and to also ensure that it gets appropriate advice at an early stage concerning matters of IP.

**University:** Wageningen University  
**Graduate School:** WIAS  
**Research Group:** Host-Microbe Interactomics (HMI)  
**Research input tenured staff 2014:** 0.9 fte

<b>Score</b>	<b>Research quality</b>	<b>1</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>3</b>

### ***Motivation scores***

HMI has been a developing team over the last period (starting in 2007). It has developed, in many aspects, in a convincing and successful manner.

The missions of the group are now well established and they are well in line with the WIAS priorities. The One Health dimension of the current and the future goals of the team appear obvious. The group has been able to increase in size and it is reaching the critical size needed to sustain its two lines of research (i.e.: Host-Pathogen Interaction/Microbiota-Host Interactions in the Intestinal Tract).

The group is still developing new skills and biological models, which offer even more opportunities for the future. Following the initial challenges inherent to emerging groups, there will be excellent opportunities for this group for collaboration with several of the groups of WIAS.

The success of both research lines could represent, per se, a challenge for the future and an appropriate allocation of financial and human resources to both should be considered carefully to sustain them equally.

### ***Research quality***

Over the period, HMI increased its publication record both quantitatively and qualitatively, with several publications in very high profile journals. Overall, the outputs of the group have been excellent, with several outstanding publications. Therefore, the group is rapidly developing a major international reputation. The two lines of research consist of wisely selected topics that are well articulated in the WIAS-WUR priorities. They serve the One Health priority in a very relevant and efficient way. Several convincing achievements have been attained in both lines of research. Considering the number of subtopics that have been treated in each line of research, the future subtopics that were presented and the size of the team, it could be wise to define a strategic research agenda based on a reasonable number of prioritized topics and to concentrate on meaningful priorities for the group. The various aspects of the determinants of pathogenicity in bacteria, such as *S. suis*, and the approach of studying host-microbiota interactions through network biology and pathway analysis should remain priorities.

### ***Relevance to society***

There is no doubt that the increased knowledge provided by the group, and its future goals, are highly relevant to society. They could contribute to human health either through promoting innovations with direct applications, or through indirect ways, by improving health and productivity in livestock species. Considering that the group is highly efficient and successful in the upstream steps of research, it might be good to establish early public-private partnerships to sustain research developments for pro-biotic / prebiotic applications, to avoid an excessive burden of work on the group. The group is making a responsible and useful use of a small animal model (i.e. mice) that is crucial for its activities.

### ***Viability***

Since 2013, the group is receiving a yearly income from graduations, which will improve its overall economic model and sustainability. For the future, it is important that the PhD student/scientific staff ratio be maintained at a reasonable level in order to provide the best possible supervision and management for the students. All the opportunities listed in the SWOT analysis of the group will, indeed, improve its viability. Therefore, they should be implemented with special emphasis on research or personal international grant applications (e.g.: ERC, H2020, ...). Considering its current stage of development, this group has the potential to lead and obtain H2020 project(s) during the future period.

Since there is currently only 1.1 fte in research staff, the viability remains fragile. An increase in tenured staff or professors will help this group in securing its future.

***Other remarks***

It is appreciated that the chair-holder emphasizes as part of the group's strategy the creation of a working environment that is not only creative and of high quality, but also is collegial and balanced. In this group, as in any other group, it is important that the scientific staff can provide an optimal level of strategic alignment to all students, in order for them to be aware of the aims and goals of their team, as well as the values of their group, regarding research activities.

***Recommendations***

A clear and shared definition of strategic scientific goals for the coming years, with the prioritization of the goals and subtopics of each of the two research lines selected by the group could be a useful tool to provide a focus on a workable number of projects and to provide the best management conditions during this period of growth and success. Leadership in international projects is the expected following step for a group that deserves recognition.

Review your recruitment strategy in terms of overall leadership and long-term viability.

<b>University:</b>	<b>Wageningen University</b>
<b>Graduate School:</b>	<b>WIAS</b>
<b>Research Group:</b>	<b>Human and Animal Physiology (HAP)</b>
<b>Research input tenured staff 2014:</b>	<b>1.4 FTE</b>

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>3</b>

### ***Motivation scores***

The current head of Human and Animal Physiology took over a group of low productivity just before the previous review. In consequence, it has taken time to build up a team of new members who fit well with the goals of the present chair. In the earlier review, it was suggested to focus on fewer areas and this has occurred. The group has specialised in the extensive role of mitochondria for metabolic health, particularly metabolic capacity and flexibility. They have a goal to elucidate the efficacy of food products to enhance these capabilities. Novel aspects relate to environmental challenges, such as hypoxic situations that can develop during obesity or ageing. The work of the group fits well within the field of human medicine, although currently the relationship with the mission of WIAS in animal sciences is less evident, but can obviously become apparent should a significant functional food be identified that could have relevance also here. The group also participates in the VLAG graduate school, where they are well positioned scientifically. The group uses model animals and has recently expanded to human subjects. The group was charged in the latest review to develop more interactions with other closely related groups within WIAS and this seems to be progressing well both within the cluster and outside. These collaborations significantly increase the relationship with animal sciences.

### ***Research quality***

The group is internationally recognised in the field, particularly for their studies on the influence of food components on mitochondrial metabolism. The group publishes in international journals of good to very good quality that cover a number of ISI fields. The publication rate is good, particularly in view of the small size of the group, with few senior members. They show considerable international activity by participation in several EU projects over the review period, including some coordinator tasks. It might be appropriate to attempt to participate in national grant committees etc. to obtain experience to enhance the chances of receiving national high-impact grants. The number of Ph.D. students has increased consistently over time and the group has good resources both financially and with respect to support staff such as lab. technicians and has access to excellent small and large infrastructure.

### ***Relevance to society***

The main societal relevance can be seen in the area of human health, where potential benefits of dietary interventions could be anticipated to have considerable effect. The group has recently developed collaboration with industry related to this field. Members of the group are active in interactions with the general public, such as interviews, lectures and popular science articles, since they have competence in areas such as nutrigenomics that have considerable public interest. Further, a large amount of transcriptomic data has been deposited for free use by colleagues.

### ***Viability***

As indicated above, the group is very well equipped and has presently a good financial situation. The composition of the senior part of the group appears stable and the positive development regarding the number of Ph.D. students promises well for the near future. There are concerns regarding the costs relating to animal experimentation, which is a concern that needs to be addressed at the University level. Closer collaboration with other Chair groups within WIAS would increase alignment (nutrigenomics would be an example). The viability score thus reflects the strategic fit in WIAS and not scientific viability.

***Other remarks***

Since the group is primarily performing good work with model animals within an area related to human health, it would be deleterious to force a change to (large) animal studies. These developments should be stimulated, but will occur naturally through the increasing number of collaborations with scientifically relevant groups within WIAS.

***Recommendations***

The expertise within the group allows a good output within the focussed areas that have been selected. The group has clearly formulated goals within areas where their contributions can have an impact. The group is small and would benefit from an increase in senior staff.

**University:** Wageningen University  
**Graduate School:** WIAS  
**Research Group:** Quantitative Veterinary Epidemiology (QVE)  
**Research input tenured staff 2014:** 1.1

<b>Score</b>	<b>Research quality</b>	<b>2</b>
	<b>Relevance to society</b>	<b>2</b>
	<b>Viability</b>	<b>3</b>

### ***Motivation scores***

Despite the small size of the group (which impacts funding and number of students), the output of the group continues to be very good. Strong bibliometric performance was achieved (RI avg. 1.79; %T10 19%), alongside a balanced funding portfolio. The group's scientific performance has been strengthened through significant collaboration, including with other Chair groups, (leading for example to a unique position in terms of epidemiology/animal models), as well as international groups (TB and EFSA on modelling infectious disease in production animals).

### ***Research quality***

In addition to the good bibliometric performance, already stated, the QVE Chair Group has delivered high quality outputs in terms of expertise (national and international levels) and advice to stakeholders for disease control strategies.

Modelling the different components of disease – susceptibility, infectivity and tolerance – including the environment, provides new insights and opportunities for new collaboration with other Chair Groups. These are then applied in carefully chosen problems that can yield sufficient data to inform and test the models. The group's activities have included major issues such as FMD, CSF, and HPAI and have extended to TB (international collaboration), digital dermatitis (dairy cattle) and ESBL in poultry.

Counter-intuitive findings from the group have led to crucial recommendations to make a more clever use of existing tools for disease management (i.e. HPAI vaccines).

### ***Relevance to society***

The chair-group has made major contributions to a very important and complex field. Advising national authorities on disease management strategies is of major relevance.

QVE's publication strategy appears to be focused on an academic audience, and less on professionals or the general public. However, the Chair's vision on the importance of public outreach is prudent and the group's work is highly relevant as it provides evidence-based arguments to raise public awareness about threats or risks that are currently misunderstood.

A considerable amount of the group's achievements is entirely consistent with the objectives of the global One Health strategy, one of the WIAS-WUR priorities.

### ***Viability***

The group is seen as among international leaders in this area of research and application. However, the relatively small group size may be a concern. The addition of Schukken should strengthen and increase output from the Group.

The future strategy, which includes continued collaboration (including strong internal WIAS cooperation), should be implementable and maintain viability.

The recent development of the Netherlands Centre of One Health represents an opportunity for the Chair Group to apply its expertise to relevant topics such as zoonoses or the pandemic of antibacterial resistance, which are high on the political agenda in the Netherlands, as in Europe.

### ***Other remarks***

Recent success in winning National Funding indicates that this may be exploited further. WIAS support for this should be considered in order to avoid dilution of the group's work.

***Recommendations***

Work within the Cluster (and potentially Chair Groups) to identify a strategy to focus on aligning new opportunities as additional focus areas.

In a group of this size, the influence of the Chair, in many domains (strategy, management, communication with stakeholders), is considerable. Therefore, the transmission of his skills and his know how, should be carefully planned and scheduled with the appropriate timing to secure the future of the group. This will likely be necessary during the next term of the Chair Group and this would improve the viability of the group. As this should require strategic support from the WIAS managers, this should be taken into account.

## Annex 1 Criteria and scores of national protocol (SEP)

### *Criterion 1: Research quality*

The Committee assesses the quality of the Chair group's research and the contribution that research makes to the body of scientific knowledge. The Committee also assesses the scale of the Chair group's research results (scientific publications, instruments and infrastructure developed by the group, and other contributions to science). The following elements are to be considered in assessing this criterion:

- scientific quality
- productivity to the scientific community (in relation to the volume of the tenured scientific staff)
- the academic reputation of the group
- the strategy to provide the output at the highest relevant level possible

### *Criterion 2: Relevance to society*

The Committee assesses the quality, scale and relevance of contributions targeting specific economic, social, or cultural target groups, of advisory reports for policy, of contributions to public debates, and so on. The point is to assess contributions in areas that the Chair group has itself designated as target areas. The following elements are to be considered in assessing this criterion:

- a narrative in which the group demonstrates its relevance for society
- research products for societal target groups such as
  - professional publications and outreach to the general public
  - other research output to society
- use of research products by societal groups such as
  - patents, licences, training courses
  - projects in cooperation with societal partners (European Union, Top-sectors, international funds)
  - contract research (including consultancies), also co-publications and use of facilities
  - present jobs of alumni
- demonstrable marks of recognition by societal groups such as demonstrated by
  - advisory reports for the government
  - media exposure as presentations on radio / TV, invited opinion articles etc.
  - membership societal advisory boards

### *Criterion 3: Viability*

The Committee assesses the strategy that the Chair group intends to pursue in the years ahead and the extent to which it is capable of meeting its targets in research and society during this period. It also considers the governance and leadership skills of the Chair group's management. The following elements are to be considered in assessing this criterion:

- leadership of the chair
- (scientific) visibility and recognition
- research vision and strength of the research lines
- innovative strength
- strategic choices and decisions
- composition of the group (expertise, people)
- acquisition capacity

*The meaning of the scores for the three main assessment criteria:*

<b>Score</b>	<b>Meaning</b>	<b>Research quality</b>	<b>Relevance to society</b>	<b>Viability</b>
1	Excellent / world leading	One of the few most influential research groups in the world in its particular field	An outstanding contribution to society	Excellent equipped for the future
2	Very good	Very good, internationally recognized research	A very good contribution to society	Very well equipped for the future
3	Good	Good research	Makes a good contribution to society	Makes responsible strategic decisions and is therefore well equipped for the future
4	Unsatisfactory	Does not achieve satisfactory results in its field	Does not make a satisfactory contribution to society	Not adequately equipped for the future

**Annex 2 Programme, Site visit WIAS Peer Review June 22 – 26, 2015****Monday 22 June**

17.00 Welcome presentation by Rector Magnificus and director WIAS

18.30 Dinner

20.00 Preliminary discussion on evaluation and dividing tasks

**Tuesday 23 June**

8.30 Director Animal Sciences Group

9.00 Introduction to WIAS (WIAS director + executive secretary)

9.30 Group 1 - Adaptation Physiology (ADP)

10.40 Group 2 - Behavioural Ecology (BHE)

11.50 Group 3 - Human and Animal Physiology (HAP)

13.00 Lunch

14.00 Group 4 - Host-Microbe Interactomics (HMI)

15.10 Excursion facilities - Zodiac Labs (ADP/HAP/HMI)

16.00 internal discussion

16.15 WIAS (PhD council)

17.00 Internal discussion

18.00 Dinner

21.00 Internal discussion

**Wednesday 24 June**

8.30 preparation of the day

9.00 Group 5 - Cell Biology and Immunology (CBI)

10.10 Group 6 - Aquaculture and Fisheries (AFI)

11.20 Group 7 - Experimental Zoology (EZO)

12.30 Lunch

13.30 Group 8 - Animal Nutrition (ANU)

14.40 Walk to Carus

14.50 Excursion facilities - Carus Fish/Respiration/Stables

16.50 Back to Zodiac +break

17.00 Break + internal discussion

17.15 Excursion facilities - Zodiac Labs (CBI/EZO/ANU/AFI)

18.15 stakeholders HAP, AFI,CBI, EZO, BHE, HMI

19.15 Internal discussion

19.30 Meeting with WIAS director and executive secretary

20.30 Dinner

21.30 Internal discussion/Preparation report

**Thursday 25 June**

- 8.30 preparation of the day
- 9.00 Group 9 - Animal Production Systems (APS)
- 10.10 Group 10 - Quantitative Veterinary Epidemiology (QVE)
- 11.20 Group 11 - Animal Breeding and Genetics (ABG)
- 12.30 Lunch
- 13.25 Walk to Radix
- 13.35 PhD pitches
- 14.30 Back to Zodiac
- 14.45 Break + internal discussion
- 18.00 stakeholders ABG, ADP, ANU, APS, QVE
- 19.00 Dinner
- 21.00 Preparation of the report

**Friday 26 June**

- 9.00 Finalizing draft report
- 10.00 Preparation debriefing presentation
- 11.00 Debriefing to WIAS community
- 12.00 Closure of site visit and lunch

### **Annex 3 Brief CV's of the Peer Review Committee members**

**Prof. dr. B. (Barbara) Cannon** (chair, Peer Review Committee)  
Stockholm University, Sweden

Barbara took a B.Sc. in biochemistry at London University and a Ph.D. in physiology at Stockholm University in 1971. After postdoctoral studies in Ottawa, she returned to Stockholm and she is now emeritus professor of physiology there. The group has contributed in recent years to noted developments in the field of brown adipose tissue and its role in metabolism, obesity and diabetes. In addition to and in parallel with her scientific achievements, she has and has had numerous honorary appointments nationally and internationally. She was for more than 25 years the director of the Wenner-Gren Institute. She has been dean of biological sciences, and she is and has been a member of a large number of biological evaluation committees, both in Sweden and abroad. She is an honorary doctor at Monash University, Melbourne, the Royal Veterinary College, London and the University of Buckingham. She has been a fellow of the Royal Swedish Academy of Sciences since 1989. She was Chairman of the Trustees of the Nobel Foundation from 2009 - 2012. She is a recipient of the King's Medal (12<sup>th</sup> magnitude) in the band of the Seraphim Order. She is currently President of the Royal Swedish Academy of Sciences.

**Dr. B. (Benoit) Fauconneau**  
INRA Bordeaux-Aquitaine Research Center, Bordeaux, France

Benoit is executive director of French national alliance on environmental research AllEnvi. By training he is agronomy engineer in animal production. He obtained his PhD in 1980 by successful defending his thesis *In vivo protein synthesis in rainbow trout (Salmo gairdnerii R.) : effect of temperature on leucine metabolism*. Before joining the AllEnvi in 2012 he was president of Bordeaux-Aquitaine INRA Research center from 2004 until 2012, Head of Hydrobiology and wildlife INRA Research department from 1997 until 2004 and Head of Growth and quality research group from 1994 until 1997. Benoit has published widely on several fish related subjects as nitrogen metabolism, muscle growth development, growth and flesh quality and diversity of metabolism. Besides he has coached and mentored several students and post docs.

**Prof. dr. S. (Stephen) Hall**  
CGIAR World Fish Center

Stephen became director general of the World Fish Center in March 2004. He was head of fish biology at the Scottish Office Agriculture Environment and Fisheries Department Marine Laboratory in Aberdeen before taking up a position as professor of marine biology at Flinders University, South Australia, and director of the Lincoln Marine Science Centre, Flinders University. In 2000 he became director of the Australian Institute of Marine Science and in 2005 was awarded the Australian Public Service Medal for leadership of the Institute. Stephen has published extensively on the structure and functioning of marine ecological systems, and especially on the effects of natural and human disturbance. He has served on many national and international Committees, and has chaired the International Council for the Exploration of the Seas Working Group on the Ecosystem Effects of Fishing Activities.

**Prof. dr. J. E. (Jan Erik) Lindberg**  
Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden

Jan Erik is professor of Animal Nutrition and Management at the Department of Animal Nutrition and Management.

He obtained his degree as Doctor of Agricultural Sciences in 1983 by successfully defending his doctoral thesis *Factors affecting predictions of rumen degradability using the nylon bag (in sacco) technique and a comparison between in vivo and in sacco degradability measurements*. Having been a research assistant and senior researcher at the SLU for several years, he became Head of the Division for mono-gastric animal metabolism and feed evaluation in 1991. His research is aimed at feed evaluation, animal nutrition and nutritional physiology, in particular diet, microbiota and host interactions.

Besides having published widely in these fields of interest, he has supervised many doctoral students and was a.o. president in the Nutrition Commission of EAAP, member of the International Scientific Committee for Digestive Physiology of Pigs and for the European Workshop on Equine Nutrition, and editor for non-ruminant nutrition in *Livestock Science*.

**Prof. dr. F. (Frauke) Ohl**

University of Utrecht, Netherlands

Frauke is Professor in Animal Welfare and Laboratory of Animal Science at the Veterinary Faculty at Utrecht University. Having been trained as a zoologist in Kiel, Germany, she worked at different high-ranking research institutes, such as the Max-Planck-Institute for Psychiatry (Munich, Germany) and the German Primate Centre (Goettingen, Germany) before she came to Utrecht in 2004.

Her central research interest is to understand how varying cognitive-emotional processes are resulting in adaptive strategies of individuals with their environment. In continuation and extension of her earlier work, she has been coordinating a research programme at the Veterinary Faculty that focusses on bridging the gap between fundamental behavioural neuroscience and applied [veterinary] animal welfare science by translating the animals' own perception of its emotional state into a biologically grounded concept of animal welfare. In order to deliver solutions to perceived welfare issues, her research group is working together with the Ethics Institute Utrecht in order to generate societally accepted and, thus, sustainable approaches to animal welfare management. Frauke's activities further include chairing the Dutch Council of Animal Affairs and membership of a variety of strategic (inter)national panels and commissions.

**Dr. T. (Thierry) Pineau**

INRA Animal Health Division, France

Thierry is in charge of the INRA Animal Health Division since January 2009. He also coordinates the INRA GISA's "Métaprogramme" for integrated Animal Health on cross-disciplinary research for livestock management and disease control.

By training Thierry is pharmacologist. He obtained his molecular pharmacology doctorate from the INSERM followed by a post-doc at the National Institutes of Health (Bethesda, USA). His work entails studies on food contaminants resulting in endocrine disorders, solving the medication and toxic mechanisms involved through cellular nuclear receptors signalling. He has published widely in these research areas. In his current job he leads the Animal Health Division (a staff of 700 coming from various scientific institutions: INRA, National veterinary schools, CIRAD, ANSES, CNRS, universities) converging towards a strategic, coordinated research, and the yearly training of about 100 doctoral students.

**Prof. dr. G. (Graham) Plastow**

University of Alberta, Canada

Graham is Professor at the Department of Agricultural, Food and Nutritional Science and Chief Executive Officer of Livestock Gentec at the University of Alberta.

After having studied Biology and Genetics at the University of Leicester, UK (and finalising this training by obtaining his PhD Genetics), he worked in the agri-food industry. A pioneer of the application of genomics in livestock, he has more than 30 years' experience in the management and implementation of

multidisciplinary research projects and technology transfer on an international basis. He has led or participated in numerous international research collaborations and has held positions on boards and Committees of industry and research organizations, including the Roslin Institute, the Genesis Faraday Partnership (now the Biosciences Knowledge Transfer Network, UK), and the Biotechnology Research and Development Corporation in the US.

Graham joined the Department of Agricultural, Food and Nutritional Science at the University of Alberta in 2007, recognizing that the expertise and industry in Western Canada represented an opportunity to create a world-leading programme across livestock species. Before this, he was Chief Technology Officer at Sygen International (one of the world's largest animal breeding companies when it was acquired by Genus in 2005/06).

**Dr. J.M. (Jules) van Rooij** (secretary peer review Committee)  
University of Groningen, The Netherlands

Jules is senior advisor at the Groningen department of Research & Valorisation. His main responsibilities are coordination of quality assurance and institutional research.

He studied marine biology in Groningen, where he also obtained his PhD on a behavioural ecological study on a Caribbean parrotfish. He then had several post doc positions (at the Netherlands Institute of Ecology and at the department of Aquaculture in Wageningen). In 2000, he returned to Groningen as advisor Research Policy. Since 2005 he coordinates the Assessment & Control of Research Quality and the university's Institutional Research. His areas of expertise further encompass Public Accountability, Key Performance Indicators, Valorisation, Benchmarking, Research Information Management and Open Access.

## Annex 4 Summary quantitative data Chair groups WIAS

Unit	Self-evaluation stats 2009-2014 (summed)					
	FteStaff (nr.)	FtePostD (nr.)	FtePhD (nr.)	K€totFund	%ResGrant	%ContrFund
ADP	24.6 (62)	5.4 (14)	69.6 (126)	16206	23%	47%
ABG	21.6 (69)	28.8 (63)	159.6 (303)	31776	23%	60%
ANU	15.6 (56)	19.8 (39)	73.8 (130)	23760	3%	77%
APS	9.42 (33)	3.72 (9)	64.14 (103)	7218	11%	57%
AFI	11 (44)	5.3 (19)	65.4 (128)	17466	11%	42%
BHE*	5.1 (15)	1.8 (3)	3.3 (5)	2094	22%	0%
CBI	11.4 (42)	16.2 (30)	34.2 (58)	13350	19%	61%
EZO	9 (41)	3 (4)	16.2 (34)	10326	26%	16%
HMI	4.8 (19)	11.4 (15)	32.4 (53)	9426	3%	63%
HAP	7.2 (21)	3 (8)	18.6 (32)	8844	0%	37%
QVE	6 (18)	0 (0)	25.2 (49)	4314	4%	42%
<b>WIAS</b>	<b>126</b>	<b>96</b>	<b>534</b>		<b>14%</b>	<b>56%</b>

**Table A)** Summed input over the six year evaluation period per Chair group and WIAS totals. Source: self-evaluation WIAS, tables obtained from the university's central administration.

Explanation:

All numbers represent summed totals over the six year period 2009-2014; all can be converted to yearly averages through division by six (n/6), except for BHE that started in 2012 only (annual average = n/3).

Fte: fraction of total university appointment available for research in fulltime equivalent (*headcounts in brackets*):

- Staff ~ full, associate and assistant professors; including staff in tenure track; on average 40% of appointment for research
- PostDocs: on average 90% of appointment for research
- PhD candidates ~ either with employee or student status; on average 75% of 'appointment' for research

K€totFund: total expenditure for personnel and other costs, including research, teaching and other activities

% ResGrant: fraction of research Fte's funded by NWO or KNAW, the two main Dutch competitive granting organisations

%ContrFund: fraction of research Fte's funded by other external organisations, e.g. industry, government (other than the ministry's direct University funds), European Commission (incl. the highly competitive ERC grants and the FP's), charity organisations.

Unit	Self-evaluation stats 2009-2014 (summed)					WoS stats 2008-2013 (summed)						
	RefPubs	PhDThes	TotAcPub	ProfPub	PopPub	RI	%T10	%T1	N	C	%Ntot	CPP
ADP	230	26	312	89	16	1.38	12%	0%	209	1637	99%	7.8
ABG	426	48	601	59	8	1.83	20%	2%	371	5079	93%	13.7
ANU	329	37	507	55	3	1.60	19%	3%	307	2524	97%	8.2
APS	139	15	223	2	0	1.70	19%	3%	98	912	84%	9.3
AFI	225	18	267	22	2	1.47	16%	1%	203	1825	91%	9.0
BHE*	52	2	66	6	8	2.05	28%	0%	25	127	93%	5.1
CBI	181	20	221	23	8	1.72	22%	3%	175	2492	96%	14.2
EZO	78	5	88	11	2	1.48	19%	1%	75	933	100%	12.4
HMI	143	12	167	34	15	4.14	33%	11%	115	2382	94%	20.7
HAP	76	2	85	8	6	1.35	18%	0%	68	903	96%	13.3
QVE	115	12	140	4	1	1.79	19%	3%	109	1282	97%	11.8
<b>WIAS</b>	<b>1780</b>	<b>155</b>	<b>2381</b>			<b>1.74</b>	<b>20%</b>	<b>3%</b>	<b>1609</b>	<b>18670</b>		<b>11.6</b>

**Table B)** Summed output over six year periods per Chair group and de-duplicated WIAS totals. Source: self-evaluation WIAS, tables obtained from either the university’s central administration (self-evaluation stats 2009-2014) or Thomson Reuters’ Web of Science (WoS stats 2008-2013).

Explanation:

All numbers represent summed totals over six year periods (2009-2014 or 2008-2013); all can be converted to yearly averages through division by six (n/6), except for BHE that started in 2012 only (annual average = n/3).

Explanation:

- RefPubs ~ Refereed articles in academic journals (i.e. including non-WoS journals)
- PhDThes ~ Dissertations successfully defended at Wageningen University, supervised by a full professor from the Chair group
- TotAcPub ~ Total number of academic publications, also including non-refereed articles, books, book chapters and conference papers
- ProfPub ~ Total number of publications aimed at a professional audience, e.g. other than academic peers
- PopPub ~ Total number of popular publications aimed at the general public
- RI ~ Relative Impact: average number of citations per paper, divided by the world average for the same ESI field and year of publication
- %T10: % WoS papers belonging to the world’s 10% most cited papers in the same ESI field and year of publication
- %T1: % WoS papers belonging to the world’s 1% most cited papers in the same ESI field and year of publication
- N, C, CPP: total number of WoS papers (N), citations (C) and average Citations per Paper (CPP = C/N)
- %Ntot: percentage of total number of peer reviewed articles covered by the WoS