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through:

The Council of Scientific Excellence
pl. Defilad 1
00-901 Warsaw
(Palace of Science and Culture, 24th floor,
room 2401)

Dr Irene Camerlink
Institute of Genetics and Animal Biotechnology
Polish Academy of Sciences

Application

dated 21 January 2021

re.: commencement of the procedure for the conferment of the post-doctoral degree of doctor habilitated in the field of agricultural sciences in the discipline of zootechnics and fisheries.

Scientific achievement which entitles the applicant to commence the procedure for the conferment of the post-doctoral degree of doctor habilitated:

One series of thematically related scientific articles published in scientific journals or in peer-reviewed materials from international conferences, which in the year of publication of the article in its final form were included in the list drawn up in accordance with the regulations issued on the basis of art. 267 paragraph. 2 point 2 lit. b.

Scientific achievement title:

Social behaviour of domestic pigs (*Sus scrofa domesticus*) and its importance for animal welfare and productivity.

A scientific achievement is a series of thematically related scientific articles, in accordance with Art. 219 paragraph. 1 point 2b of the Act. The series includes 12 scientific articles on the same subject, which were published in 2015-2020 (the doctorate was obtained on 07/2014). I was first or corresponding author for all of these articles. For each article, the journal's impact factor in the year of publication is provided (source: InCites Journal Citation Report) and the score of the Ministry of Science and Higher Education (MNiSW). The total number of MNiSW points for scientific articles included in the scientific achievement is 1500.

Pursuant to art. 221 para 10 of the Higher Education and Science Act dated 20 July 2018 (Polish Journal of Laws of 2018 item 1668, as amended) I hereby kindly request that the habilitation commission pass a resolution on the conferment of the post-doctoral degree of doctor habilitated in open voting.

I was advised of the following:

The President of the Scientific Council of Excellence with its registered office in Warsaw (pl. Defilad 1, 24th floor, 00-901 Warsaw) is the Administrator of personal data collected under the procedure for the conferment of the post-doctoral degree of doctor habilitated.

Contact us via e-mail: kancelaria@rdn.gov.pl , phone 22 656 60 98 or personally at our office. Personal data shall be processed pursuant to art. 6 para 1 letter c) Regulation (EU) 2016/679 dated 27 April 2016 in connection with art. 220-221 and art. 232-240 of the Higher Education and Science Act dated 20 July 2018, for the purposes of the procedure for the conferment of the post-doctoral degree of doctor habilitated and in order to exercise the rights and obligations as well as the right to appeal in this procedure.

For detailed information on processing personal data in the procedure see www.rdn.gov.pl/klauzula-informacyjna-rodo.html

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(Applicant's signature)

Attachments:

- Personal Data of the Applicant
- Summary of Professional Accomplishments
- List of scientific or artistic achievements
- Author declarations

Personal Data of the Applicant

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8. Number and series of identity card if the applicant is not a PESEL holder: N/A

.....

(Applicant's signature)

Summary of Professional Accomplishments

1. **Name:** Irene Camerlink
2. **Diplomas, degrees conferred in specific areas of science or arts, including the name of the institution which conferred the degree, year of degree conferment, title of the PhD dissertation**

PhD in Animal Sciences. Degree conferred in 2014 by Wageningen University, The Netherlands, by the Animal Breeding and Genomics Centre. PhD Title: ‘Sociable swine: Indirect genetic effects on growth rate and their effect on behaviour and production of pigs in different environments’.

MSc Research Master in Animal Sciences. Degree conferred in 2009 by Wageningen University, The Netherlands. Specialization in Animal Production Systems.

Professional Bachelor in Animal Health Care, providing the title of BSc (Ing.). Degree conferred in 2007 by Van Hall Larenstein, University of Applied Sciences, Leeuwarden, The Netherlands.

3. **Information on employment in research institutes or faculties/departments or school of arts**
Assistant professor (01/2020 – current) at the Institute of Genetics and Animal Biotechnology of the Polish Academy of Sciences, Department of Animal Behavior and Welfare.

Postdoctoral researcher (03/2018 – 03/2020) at University of Veterinary Medicine Vienna, Austria. Department of Farm Animals and Veterinary Public Health, Institute of Animal Welfare Science.

Postdoctoral researcher (04/2014 – 03/2018) at Scotland’s Rural College (SRUC), Edinburgh, United Kingdom. Animal Behaviour and Welfare team within Animal Veterinary Sciences.

Administrator (02/2017 – 04/2017) for the British Society of Animal Sciences (BSAS).

PhD candidate (11/2009 – 03/2014) in Animal Sciences at Wageningen University, The Netherlands. Animal Breeding and Genomics Centre; and Adaptation Physiology department.

4. **Description of the achievements, set out in art. 219 para 1 point 2 of the Act**

The scientific achievement is titled ‘Social behaviour of domestic pigs (*Sus scrofa domestica*) and its relevance to animal welfare and productivity’. The achievement is a cycle of 12 internationally peer-reviewed scientific papers, in the same subject area, published during 2015-2020 (after conferment of a PhD degree). In all of these papers I was a first or corresponding author. The total number of points according to the sum of scores of the Ministry of Science and Higher Education (MNiSW) is 1500. The cycle of papers is discussed for its significance to research and society.

Social behaviour of domestic pigs (*Sus scrofa domesticus*) and its importance for animal welfare and productivity.

Background

Pigs are one of the main livestock species, with nearly 1.5 billion production pigs worldwide (FAOSTAT, 2018). Together they account for approximately 1.2 billion tonnes of meat per year for human food consumption (FAOSTAT, 2018). Pig husbandry is therefore an important part of the agricultural sector. The pig sector has however been criticized by society on many fronts, including its negative impact on the environment and on animal welfare. Animal welfare has in the last decade considerably grown as a societal concern, and is in a growing number of countries being addressed at the social, industry, political and/or retail level (Alonso et al., 2020). The animal welfare issues within the pig sector need to be improved in order to reach a better sustainability of the sector.

Commercial pig husbandry has, especially in the post-industrialized countries, intensified considerably with the increase of technological advances. This has resulted in larger farms with more animals per farm and fewer farmers. To keep animals as efficiently as possible, pigs are housed at minimum stocking density in barren pens. In Europe, several of the most restrictive housing systems have been phased out, such as gestation crates for sows. In most parts of the world, however, the restrictive housing systems are still in operation. This means that the majority of the breeding animals (i.e. sows) are kept in narrow metal crates for most of their life. They are unable to walk or turn around within the boundaries of the crate. Production pigs are kept in groups at a high stocking density. These housing conditions lead to high levels of stress and abnormal behaviour. Behavioural problems include, among others, damaging oral manipulation of conspecifics (e.g. cannibalism on the tail and ears) and intraspecific aggressive behaviour. Another main pig welfare issue is the mutilation of piglets, such as castration and tail docking, in order to prevent the behavioural problems and to improve product quality. In my research, I focus on the social behaviour of pigs and how this relates to the behaviours that are considered problematic.

Development of social behaviour in piglets

Domestic pigs (*Sus scrofa domesticus*) have an elaborate social behavioural repertoire. Their behaviour is still very similar to that of their ancestors the wild boar (*Sus scrofa*). When domestic pigs are released in the wild or in a semi-natural environment, they will quickly adapt and express the full behavioural pattern required for survival (Stolba & Wood-Gush, 1989). In nature, pigs form matrilineal sounder groups that include several sows with their offspring. Adult males disperse from the group and live mostly solitary except for in the breeding season. Pregnant sows close to the parturition day will start building a nest at a sheltered place to give birth at a distance away from the group. In the first week of the piglets' life, they stay in the nest with their mother. From the second week of life, they start to range outside of the nest together with the sow. At this stage they also meet the rest of the herd, and will encounter other piglets of similar and older age. Over time they gradually integrate in the group and become more independent. In commercial husbandry, this phase of socialization with other piglets is absent. There, piglets remain isolated with the sow up to three to four weeks of age, and then are abruptly separated from the sow and regrouped with unfamiliar piglets of the same age. In the late



Figure 1. Increasing social skills of piglets by encouraging social contacts between litters [A1, A2]. Photo: M. Farish.

nineties, the first scientific studies questioned whether the absence of this socialization phase could be a reason for abnormal behaviour of piglets and their poor performance at weaning (Pluske & Williams, 1996). Several studies were conducted on providing piglets with the experience of encountering unfamiliar piglets of the same age, around the second week of life (e.g. Wattanakul et al., 1997; Hessel et al., 2006), similar to the situation in nature. It was found that piglets that had been socialized would fight less when meeting unfamiliar pigs later on at weaning. They also had a better growth performance around weaning. However, the long-term impact of socialization on their behaviour was unknown. In the study described in [A1 of the cycle of scientific achievements, Camerlink et al., 2019, *Royal Society Open Science*] and [A2, Camerlink et al., 2018, *Animals*] we studied 683 piglets, as part of a large scale project funded by the Biotechnology and Biological Sciences Research Council (BBSRC). Half of the animals were socialized with other piglets from two weeks of age (Figure 1) and the other half were kept isolated with the sow as in conventional practice. Pigs were observed for their behaviour and growth performance until eight weeks of age. I found that socialized pigs show behavioural changes that are noticeable till at least eight weeks of age, in particularly shown by a reduction in aggression [A2]. When looking more specifically at their agonistic behaviour, we see that socialized pigs sooner get into a fight but are able to resolve the conflict with a shorter fight duration, suggesting better opponent assessment skills [A1].

To apply this technique of socialization in practice is however not without risks and efforts. For example, we found that sows of socialized piglets had more injuries on their udders, potentially do to competition for milk between her own piglets and the visiting piglets [A2]. When I surveyed farmers about their experienced with socialization techniques, they mentioned several concerns, including increased work load [A3, Camerlink & Turner, 2017, *Applied Animal Behaviour Science*]. In collaboration with the Autonomous University of Barcelona (UAB, Spain), we have been able to demonstrate that socialization of piglets can be beneficial for productivity and animal welfare even in large scale commercial farms (Salazar et al., 2018), and that the effects may maintain up to slaughter age (Ko et al., 2020). As a consequence of the work, early-life socialization is now recommended as the most effective strategy to reduce aggression between pigs, in case pigs need to be regrouped.

Although early life socialization helps piglets to better overcome the stress caused by the abrupt and early weaning in commercial practice, weaning remains one of the most stressful events in the pig's life (Campbell et al., 2013). In another study, I found that the behaviour at weaning was related to the piglets' genetic background and to the environment (Camerlink et al., 2018, *Behavior Genetics*). This was in line with the findings from my PhD study, which was funded by the Dutch Research Council (NWO), where I showed that pigs that were genetically selected to have a positive effect on their pen mates expressed better social skills, in particularly in aggression (e.g. Camerlink et al., 2015, *Behavior Genetics*).

Aggressive behaviour: normal or extreme?

Aggression between commercially housed pigs is considered a major animal welfare problem. It has been researched since the 1950's and has thereafter received continued research attention (Peden et al., 2018). The problem remains persistent, and I hypothesized that this may be partly due to the perception of farmers. After surveying pig farmers about their perspective on pig aggression, I could confirm this hypothesis. Namely, the majority of farmers did not consider aggression to be a problem [A3]. The outcome of this survey provided me with the idea for a PhD project combining animal welfare, social sciences and economy. The outcomes of that project have provided valuable insights in the decisions that pig farmers make regarding animal welfare, both morally and economically (Peden et al., 2019). This novel demand-driven approach, of combining farmer opinion with willingness-to-pay for welfare changes, can be equally applied to other animal welfare problems. Despite farmers perception of pig aggression, it is considered an societal concern as it does harm the animals' welfare.

In my extensive work on pig aggression, funded through a prestigious 3-year BBSRC grant, I looked amongst others at their skin injuries as a result of fighting (Figure 2a), and the energy demands of fighting in terms of blood glucose and blood lactate levels [A4, Camerlink et al., 2016, *Applied Animal Behaviour Science*]. These values indicated that fighting is highly costly to the animal. In order to sample blood for measuring lactate and glucose, we used techniques that were available in human medicine. By validating this method we could adopt a much less invasive procedure, taking only a drop of blood from the ear vein. For this method, our main animal technician on the project was awarded the 3R prize for refinement, reduction and replacement of animal experiments. That aggressive interactions between pigs are costly and fatiguing was further confirmed with infrared thermography (Figure 2b). Using infrared thermography revealed a sudden drop in body temperature at the moment of social defeat, suggesting that the moment of defeat is most impactful in terms of stress (Boileau et al., 2019, *Physiology & Behavior*). Besides physiological measures, I took proxy-measures of emotional state like facial expressions (Figure 2c) [A5, Camerlink et al., 2018, *Scientific Reports*] and we applied the method of qualitative behaviour assessment [A4] alongside the physiological measures.

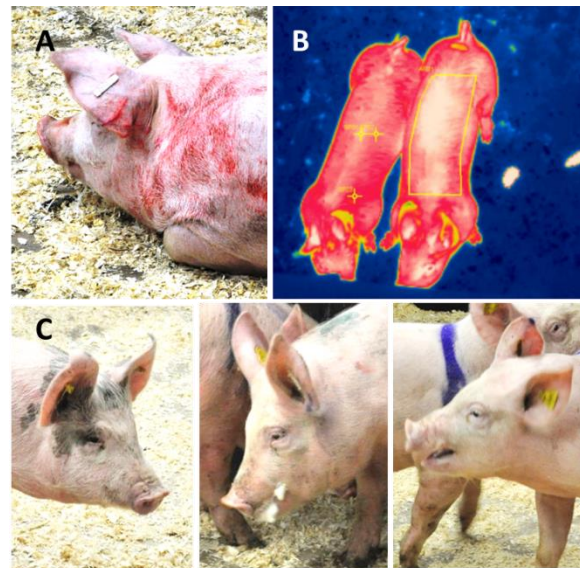


Figure 2. A) Skin lesions as a result of aggression; B) Fighting pigs recorded with infrared thermography; and C) Facial expressions before and during a contest and at the moment after defeat.

Pigs mainly fight to establish dominance relationships. As pigs in nature would live in small static groups, their social organisation is based on stable dominance relationships. Pigs may form linear dominance hierarchies (Meese & Ewbank, 1973) although only the top and bottom ranked animals seem to have a more permanent position. Dominance relationships are established and maintained through agonistic behaviour. Agonistic behaviour includes the full behavioural repertoire related to aggression, including threat, display behaviour and withdraw. Aggressive behaviour only considers the damaging phase of the interaction, including biting and fighting.

In stable social groups the level of aggression is low as pigs recognise each other. When an unfamiliar pig enters the group, such as would be the case in the breeding season, intense fights will occur between the resident pigs and the intruder pig. This scenario has been mimicked with the resident-intruder paradigm, initially developed for rodents (Koolhaas et al., 2013) but later applied to pigs (Erhard & Mendl, 1997). The resident-intruder (RI) test has in pigs been used to create a proxy measure of aggressiveness as a personality trait (D'Eath & Pickup, 2002). In the test, a smaller unfamiliar intruder pig is introduced in the home environment of the larger resident pig. The time before the resident attacks the intruder is interpreted as a reflection of aggressiveness. In several elaborative studies, I related this RI test aggressiveness to pigs' later agonistic behaviour when staged in a contest against an equal-sized, smaller or larger opponent [A6, Camerlink et al., 2016, *Animal Behaviour*, A7, Camerlink et al., 2015, *Animal Behaviour*]. More aggressive pigs were faster to attack their opponent and more often initiated an attack [A7]. Dyadic contests followed a systematic escalation pattern including ritual display behaviour [A6]. Most notable was that in 27% of the contests a dominance relationship was established without a fight [A6]. This variation in the population shows that pigs do have the opportunity to solve rank issues without escalated aggression. Pigs identified in the RI test as being more aggressive were not more likely to win a contest in case the contest escalated into a fight [A7]. This led us to the important conclusion that aggressiveness is, at least in pigs, not a component of their fighting ability

(also called Resource Holding Potential, RHP) (Arnott & Elwood, 2009). In further studies on the same topic, I did find that prior experience of fighting alters pigs' opponent assessment abilities in later life. Pigs that had been regrouped with unfamiliar pigs, and thus had to establish dominance relationships, were able to conclude future fights in a shorter duration [A8, Camerlink et al., 2017, *Scientific Reports*]. Therefore, experience of fighting does equip pigs with better decision making skills for future encounters. Lateralization in behavioural functions, which is related to the use of different brain regions, also seemed to reduce the fight duration between pigs [A9, Camerlink et al., 2018, *Scientific Reports*]. On the population level, pigs did not show a preference for left or right orientation towards the opponent, but individual lateralization was present, meaning that some pigs preferred to attack the opponent from either the left or the right side [A9]. The study was the first to address lateralization in pigs' behaviour. When speaking with stakeholders, an important question that often arises is: what is normal aggression? Agonistic behaviour, including aggression, is a natural behaviour that can also be witnessed in the wild, especially during the mating season. An important aspect in agonistic behaviour is the opportunity to withdraw from a conflict and to signal defeat. In commercial farming, pigs are housed in such restricted space that there is limited opportunity to perform the ritualized agonistic display behaviour or to withdraw from an encounter. When the agonistic behaviour cannot be properly expressed, and the animals cannot escape, pigs are more likely to escalate into a fight. In commercial husbandry, the level of aggression is therefore much higher than would be the case in a more natural setting. The frequent regrouping of unfamiliar pigs for management purposes further elevates the already heightened aggression.

A case of a very extreme type of aggression, with a different background, is lethal gang aggression [A10, Camerlink et al., 2020, *Animals*]. Lethal gang aggression in pigs involves that several pigs from a stable social group attack and kill a familiar conspecific. This type of aggression had never been researched before, as it was thought to be rare in occurrence. In 2017, I initiated a project to study it and in August 2020 it was published on the front cover of the international peer-reviewed journal *Animals* from the JCR list. Lethal gang aggression occurred infrequently but revealed to have a major impact on affected farms (Figure 3). Studying this extreme social behaviour has opened up a new research topic that was previously unaddressed.

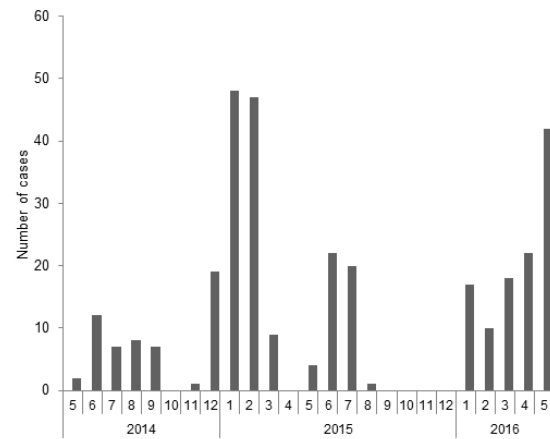


Figure 3. Number of victims of lethal gang aggression per month on one affected farm.

Social nosing and its function in pig social behaviour

Pigs' innate behaviour, and main occupation during the day, is rooting and foraging for food. They thus have a strong natural drive to explore the environment with their snout (Van Putten, 1979). The inability to use their snout in the barren commercial housing systems is one of the main causes of abnormal behaviour, as part of the explorative behaviour is redirected towards pen mates instead of the environment. In nearly any form of social contact, including agonistic behaviour, pigs will show some form of social nosing. This is often scored as nose-to-nose or nose-to-head contact. Already during my PhD I started to look separately into social nosing in pigs (Camerlink & Turner, 2013, *Applied Animal Behaviour Science*), a topic that was usually not given much attention. Existing observations on social nosing labelled it as negative behaviour, due to its correlation with tail biting, which is a harmful behaviour. In the initial work (Camerlink & Turner, 2013) I showed that social nosing was overall not a negative behaviour. In contrast, it is a mostly neutral or positive social communicative behaviour, and

only body nosing and nosing of the hindquarters (around the tail) is correlated with tail biting behaviour. This was supported by another study, in which I found that pigs that received more nose contacts had a better growth performance (Camerlink et al., 2012, *Applied Animal Behaviour Science*). The same result was confirmed in a recent study that is submitted for publication. I hypothesized that direct nose contact is a form of affiliation, and that the neuropeptide oxytocin may be a mediator in the better growth performance. In a study where we administered exogenous oxytocin intranasal (i.e. in the snout), there was more social nosing in groups upon reunion with familiar pen mates (Camerlink, Reimert & Bolhuis, 2016, *Physiology & Behavior*). In a later study, we looked at whether nose contact between the sow and her piglets is important in the coping abilities of the piglets [A11, Portele et al., 2019, *Animals*] (Figure 4). To my knowledge, I am the only person researching social nosing in pigs specifically. I am currently continuing on this topic, with the main hypothesis that direct nose-nose contact is a form of affiliative behaviour, whereas nose-nose proximity is a form of social recognition. Hereby I hypothesize that direct nose-nose contact is related to a better growth performance (showing benefits for the recipient) whereas nose-nose proximity is related to behaviours associated with social recognition, including aggression.



Figure 4. Throughout my career, a strong focus has been on social nosing as a form of socio-positive communication.

Micro-expressions and the need for refinement of ethograms

Social nosing is just one of the many behaviours in which it is important to distinguish clearly between the different forms of the behaviour. In a recent review on tail postures in pigs, I emphasized the importance of distinguishing precisely between the different postures in order to draw conclusions about the pigs' welfare state [A12, Camerlink & Ursinus, *Applied Animal Behaviour Science*]. Tail posture is increasingly used as a proxy-measure of welfare, as it among others indicates the occurrence of tail biting behaviour in a group. The review outlines that tail postures can have a much broader application, for example in the assessment of positive behaviour. Animals communicate in a very subtle way by using mainly non-verbal communication. In my current work I am focussing on the use of micro-expressions in animal social behaviour (Camerlink, 2020). Micro-expressions involve minute expressions or behaviours that typically last less than four seconds. The term micro-expressions originates from human psychotherapy (Haggard & Isaacs, 1966) and has been used extensively in research on human emotions, but has not been applied yet in animal behaviour sciences. In several invited talks at international conferences (e.g. Camerlink, 2020), I have presented the idea of micro-expressions to adopt these techniques in animal sciences. Using micro-expressions in ethograms on social behaviour may refine the current interpretation of behaviour and may increase the understanding of animal communication and thus animal welfare.

To conclude, my main achievements that contributed to the field of animal behaviour and welfare science are:

1. I have proved that the socialization of pigs early in life has a beneficial effect on their development and expression of social behavior and improves animal welfare.
2. I was the first to demonstrate behavioral laterality in pigs, which may be the basis for the development of non-invasive indicators of animal welfare.
3. I have shown that contacts nose-nose contact in pigs serves a communication function and in most cases are affiliate rather than aggressive.

4. I was the first to conduct research on intraspecific lethal gang aggression in pigs in socially stabilized groups of pigs. This is a type of intra-group collective aggression displayed by some of the same individuals towards another individual in the group. So far, this type of aggression has not been found in any other species on this scale.
5. I have shown that the experience gained in aggressive interactions by pigs (e.g. in fighting) allows them to develop “mutual assessment strategies” by which they assess their opponent.
6. My studies revealed that pigs do not necessarily need to fight in order to establish a dominance hierarchy, which opens opportunities to reduce aggression in practice

References

- Alonso, M. E., González-Montaña, J. R., & Lomillos, J. M. (2020). Consumers’ concerns and perceptions of farm animal welfare. *Animals*, 10(3), 385.
- Arnott, G., & Elwood, R. W. (2009). Assessment of fighting ability in animal contests. *Animal Behaviour*, 77(5), 991-1004.
- Boileau, A., Farish, M., Turner, S. P., & Camerlink, I. (2019). Infrared thermography of agonistic behaviour in pigs. *Physiology & Behavior*, 210, 112637.
- Camerlink, I. (2020). The importance of micro-expressions in animals’ social interactions. Conference proceedings of the Virtual UFAW Animal Welfare Conference ‘Recent advances in animal welfare science VII’, June 2020, Wheathampstead, UK
- Camerlink, I., Bijma, P., Kemp, B., & Bolhuis, J. E. (2012). Relationship between growth rate and oral manipulation, social nosing, and aggression in finishing pigs. *Applied Animal Behaviour Science*, 142(1-2), 11-17.
- Camerlink, I., & Turner, S. P. (2013). The pig's nose and its role in dominance relationships and harmful behaviour. *Applied Animal Behaviour Science*, 145(3-4), 84-91.
- Camerlink, I., Ursinus, W. W., Bijma, P., Kemp, B., & Bolhuis, J. E. (2015). Indirect genetic effects for growth rate in domestic pigs alter aggressive and manipulative biting behaviour. *Behavior genetics*, 45(1), 117-126.
- Camerlink, I., Reimert, I., Bolhuis, J.E. (2016). Intranasal oxytocin administration in relationship to social behaviour in domestic pigs. *Physiology & Behavior* 163, 51-55.
- Camerlink, I., Ursinus, W. W., Bartels, A. C., Bijma, P., & Bolhuis, J. E. (2018). Indirect genetic effects for growth in pigs affect behaviour and weight around weaning. *Behavior Genetics*, 48(5), 413-420.
- Campbell, J. M., Crenshaw, J. D., & Polo, J. (2013). The biological stress of early weaned piglets. *Journal of animal science and biotechnology*, 4(1), 1-4.
- D'Eath, R. B., & Pickup, H. E. (2002). Behaviour of young growing pigs in a resident-intruder test designed to measure aggressiveness. *Aggressive Behavior: Official Journal of the International Society for Research on Aggression*, 28(5), 401-415.
- Erhard, H. W., & Mendl, M. (1997). Measuring aggressiveness in growing pigs in a resident-intruder situation. *Applied Animal Behaviour Science*, 54(2-3), 123-136.
- FAOSTAT, 2018. The Food and Agriculture Organization of the United Nations, Statistics. <http://www.fao.org/faostat/en/#data> Last accessed 9/9/2020.
- Haggard, E. A., & Isaacs, K. S. (1966). Micromomentary facial expressions as indicators of ego mechanisms in psychotherapy. In *Methods of research in psychotherapy* (pp. 154-165). Springer, Boston, MA.
- Hessel, E. F., Reiners, K., & Van den Weghe, H. F. A. (2006). Socializing piglets before weaning: Effects on behavior of lactating sows, pre-and postweaning behavior, and performance of piglets. *Journal of animal science*, 84(10), 2847-2855.

- Ko, H. L., Chong, Q., Escribano, D., Camerlink, I., Manteca, X., & Llonch, P. (2020). Pre-weaning socialization and environmental enrichment affect life-long response to regrouping in commercially-reared pigs. *Applied Animal Behaviour Science*, 105044.
- Koolhaas, J. M., Coppens, C. M., de Boer, S. F., Buwalda, B., Meerlo, P., & Timmermans, P. J. (2013). The resident-intruder paradigm: a standardized test for aggression, violence and social stress. *JoVE (Journal of Visualized Experiments)*, (77), e4367.
- Meese, G. B., & Ewbank, R. (1973). The establishment and nature of the dominance hierarchy in the domesticated pig. *Animal behaviour*, 21(2), 326-334.
- Peden, R. S., Turner, S. P., Boyle, L. A., & Camerlink, I. (2018). The translation of animal welfare research into practice: the case of mixing aggression between pigs. *Applied Animal Behaviour Science*, 204, 1-9.
- Peden, R. S., Akaichi, F., Camerlink, I., Boyle, L. A., & Turner, S. P. (2019). Factors influencing farmer willingness to reduce aggression between pigs. *Animals*, 9(1), 6.
- Pluske, J. R., & Williams, I. H. (1996). Reducing stress in piglets as a means of increasing production after weaning: administration of amperozide or co-mingling of piglets during lactation?. *Animal Science*, 62(01), 121-130.
- Stolba, A., & Wood-Gush, D. G. M. (1989). The behaviour of pigs in a semi-natural environment. *Animal Science*, 48(2), 419-425.
- Salazar, L. C., Ko, H. L., Yang, C. H., Llonch, L., Manteca, X., Camerlink, I., & Llonch, P. (2018). Early socialisation as a strategy to increase piglets' social skills in intensive farming conditions. *Applied Animal Behaviour Science*, 206, 25-31.
- Van Putten, G. (1979). Ever been close to a nosey pig?. *Applied Animal Ethology*, 5(3), 298.
- Wattanukul, W., Stewart, A. H., Edwards, S. A., & English, P. R. (1997). Effects of grouping piglets and changing sow location on suckling behaviour and performance. *Applied Animal Behaviour Science*, 55(1-2), 21-35.

5. Presentation of significant scientific or artistic activity carried out at more than one university, scientific or cultural institution, especially at foreign institutions

During my career I have worked abroad at Scotland's Rural College (SRUC) in Edinburgh, UK and at the University of Veterinary Medicine (Vetmeduni), Vienna, Austria, after the completion of my PhD studies at Wageningen University in the Netherlands. In addition, I have completed the following internships / research visits in foreign institutions:

Edinburgh, United Kingdom. During my PhD studies at Wageningen University, Netherlands, I conducted in two internships at Scotland's Rural College (SRUC) in Edinburgh, UK.

First, for two full months of May to June 2012, I collaborated with Dr Turner on projects. The aim of this visit was for me to gain experience in other labs abroad and to broaden my network. Another aim was to collaboratively write a publication based on data collected during the first years of my PhD studies. This data regarded social behaviour in pigs, with a focus on aggression. As Dr Turner is an expert in pig aggression, the visit was very fruitful. During the visit I analysed the data and we jointly wrote the publication, which was later published in the journal PLoS One. In addition, I collected new data at the SRUC research farm. The aim of this was to look more closely into social nosing in pigs, and to study whether it was related to dominance hierarchies. Having access to the pig research facilities in Edinburgh, I did behavioural observations on juvenile male and female pigs, using an ethogram with detailed behaviours of nose contact. I also conducted feed competition tests as a measure of dominance hierarchies. I assisted in several other animal trials, thereby expanding my knowledge and skills. The data was collected within the course of the 2-month visit.

Then, on a second visit from 13/11/2013 to 8/12/2013, I returned to jointly write a publication out of the earlier collected data. The data was analysed after the first visit, and the aim of the second visit was to finalize the publication. This was successfully completed within the short stay, and the paper was published in the journal Applied Animal Behaviour Science as Camerlink & Turner, 2013. The paper describes how social nosing (i.e. exploration of other pigs with the nose) in pigs is mainly an investigative behaviour serving the purpose of social recognition. It is much less related to damaging behaviour, and thereby it provided evidence against existing hypotheses on this behaviour. Nosing behaviour was unrelated to dominance hierarchy. Both successful visits formed a strong basis of later collaborative works.

Barcelona, Spain. During my postdoctoral position at SRUC, UK, I obtained in 2017 an ERASMUS grant to visit Universitat Autònoma de Barcelona (UAB), Spain. The aim of the visit was to broaden my network and to strengthen the collaboration with the host institute. Another aim was to discuss the possibilities of jointly applying for a Marie Curie Fellowship. During the two week internship (16-29 September 2017) I gave various lectures to researchers, veterinarians and students and collaborated with the host on research projects. The internship included various farm and company visits in order to familiarize myself with the possibilities for research. As a result, we applied for a Marie Curie Fellowship, and I was invited by the host to co-edit a book for 5M Publishing. The collaborative work carried out in that visit has resulted in co-authorship on three peer-reviewed publications.

6. Presentation of teaching and organizational achievements as well as achievements in popularization of science or art

Teaching

In both my postdoctoral functions I was 100% allocated to research and therefore my teaching hours consist mainly of guest lectures, teaching of smaller courses and student supervision. The lectures include:

- ‘Science in Veterinary Medicine - Foundation I’, University of Veterinary Medicine Vienna, Austria, Semester 1-3, 2019/2020
- ‘Projectwork: Applied Ethology and Animal Welfare’, University of Veterinary Medicine Vienna, Austria, Semester 1, 2019
- ‘Projectwork: Applied Ethology and Animal Welfare’, University of Veterinary Medicine Vienna, Austria, Semester 1, 2018
- Animal welfare, Guest lecture, Polytechnic Institute of Portalegre, Portugal, April 2019
- Animal welfare, Guest lectures, Polytechnic Institute of Portalegre, Portugal, Feb 2019
- Applied Animal Welfare guest lecture, Wageningen University, Netherlands, 2012 and 2013
- Applied Animal Welfare lecture on thermoregulation and welfare, Wageningen University, Netherlands, 2013.

Student supervision and mentoring

From 2010 to 2020 I have supervised 21 BSc/internship students and 15 MSc students, who all completed their projects on time with a good grade. Since 2016 I supervise each year a MSc student project (6 months) for the University of Edinburgh, UK. Several MSc student projects have resulted in peer-reviewed papers, where I encourage the students to be first author. From 2015-2019, I co-supervised a PhD student, who has now successfully attained her PhD degree with 5 peer-reviewed publications. I am currently co-supervising a second PhD student who is based at SRUC, Edinburgh, UK. In my supervision I focus on informing the student so that he/she can make an informed choice for their future career direction, and to prepare them for PhD studies in case they are eager to pursue this path. Several of the supervised students are currently PhD candidates.

Organisational achievements

- In 2020, I was member of the scientific committee for the *International Conference of the International Society for Applied Ethology (ISAE)*, held online from 6-7 August 2020.
- In 2016, I was member of the organizing committee of the *International Conference of the International Society for Applied Ethology (ISAE)*, held in Edinburgh, UK, 12-15 July 2016.
- On 8/10/2015, I organised a stakeholder meeting with representatives of pig industry in UK.
- Before the completion of my PhD, on 14/05/2013 and 23/03/2012, I organised a stakeholder workshop for pig farmers, industry (feed companies, veterinarians, pig breeding organisation), and government representatives. Both meetings were organised in The Netherlands and had each 30-40 participants.
- I have been main organizer of the symposium ‘*Connecting Conspecifics Colloquium*’, held in Edinburgh, UK, 26/06/2013.

Popularization of science

From 2012 to 2020 I have written 22 articles for technical magazines and websites for farmers (these are described in the scientific achievement part III.1). In 2019 I have been working as a freelance writer for The Pig Site (*5m Publishing*), and in 2020 I started as columnist for the international magazine PigProgress (Misset International).

In 2019 I started a YouTube Channel named ‘Animal Welfare Science’ as a way to collect educational material and to share more with society about animal welfare science. The channel has currently 35 videos, with at least two new videos being uploaded very month. The channel has currently 73 subscribers and several videos have more than 300 views.

7. Apart from information set out in 1-6 above, the applicant may include other information about his/her professional career, which he/she deems important.

Not listed in points 1-6 above are awards and obtained funding. I would like to highlight these here, as they have played a pivotal role in my career.

In 2012 I won the Vithoulkas award from the International Academy of Classical Homeopathy for the best international publication on homeopathy published in a peer-reviewed journal in 2011. The paper was based on my BSc project, and the publication and award gave a confident start to my later MSc and PhD studies. In 2016, I was awarded the Young Investigators Award of the International Society for Research on Aggression (ISRA). In 2017, I won the competitive New Investigator Award of the International Society of Applied Ethology (ISAE), which is the main organisation in my field of research. This highly recognised award sparked my further research career and gave my work increased international recognition. In 2020, I was awarded the prestigious UFAW Young Animal Welfare Scientist of the Year Award, 2020. This award is given to scientists in animal welfare, who are within seven years of the attainment of their PhD.

After my PhD, I obtained the following funding:

Year	Funder	Type	Leading institute	Title	Involvement	Budget
2019	EU COST	Short Term Scientific Mission	EU COST Action GroupHouseNet	Performance, behaviour and welfare in extensive pig production systems in Portugal	beneficiary	€2290
2019	EU COST	Short Term Scientific Mission	EU COST Action GroupHouseNet	Development of an ethogram for subtle social behaviours in pigs	beneficiary	€2290
2018	SRUC	3-year Postgraduate studentship	SRUC, UK	The role of cognitive ability and affective state during aggressive encounters	co-applicant	£78000
2017	USDA	4-year research project	Michigan State University, USA	Implementing Phenomics and genomics analyses of behavioral traits to reduce aggression in group housed pigs	co-applicant	\$999863

2017	ERASMUS	Researchers+ Grant	SRUC, UK	Study visit to UAB, Barcelona, Spain	beneficiary	£1819
2016	SRUC	3-year Postgraduate studentship	SRUC, UK	Demand driven solutions to reduce aggression between pigs	co-applicant	£78000
2016	Open Philanthropy Project	3-year project	The Jeanne Machig Institute	Farm animal welfare advocacy in China	co-applicant	£201594
2016	British Council	Scholarship Newton Fund workshop	Jaboticabal, Brazil	Methods, strategies and tools to generate, analyse and incorporate genomic data into livestock breeding programs	beneficiary	£2000
2016	British Council	Scholarship Newton Fund workshop	Nottingham University UK / KMITL Thailand	Sustainable Pig Production	beneficiary	£2000

.....
 (Applicant's signature)

**List of scientific or artistic achievements
which present a major contribution to the development of a specific discipline**

Information contained herein regards the period after the conferment of the PhD degree, unless otherwise specified (for publications prior to the attainment of the PhD degree).

**I. INFORMATION ON SCIENTIFIC OR ARTISTIC ACHIEVEMENTS SET OUT IN
ART. 219 PARA 1. POINT 2 OF THE ACT**

The scientific achievement is a cycle of scientific articles related thematically, pursuant to art. 219 para 1. point 2b of the Act.

The cycle is titled ‘**Social behaviour of domestic pigs (*Sus scrofa domestica*) and its relevance to animal welfare and productivity**’ and comprises **12 scientific papers** in the same subject area published during 2015-2020 (PhD obtained 07/2014). In all of these papers I was the corresponding author. For each of the papers an impact factor of the Journal is given for the year of publication (source: *InCites Journal Citation Report*) and the 2019 scores of the Ministry of Science and Higher Education (MNiSW). The cumulative Ministry of Science and Higher Education points of the below-mentioned scientific papers included in the scientific achievement is **1500 points**.

Cycle of scientific articles related thematically:

[A1] Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2019). Advantages of social skills for contest resolution. *Royal Society open science*, 6(5), 181456. <https://doi.org/10.1098/rsos.181456> Impact factor: **2.647**, Q2, MNiSW points: **100**.

[A2] Camerlink, I., Farish, M., D’Eath, R.B., Arnott, G., & Turner, S.P. (2018). Long term benefits on social behaviour after early life socialization of piglets. *Animals*, 8(11), 192. <https://doi.org/10.3390/ani8110192> Impact factor: **1.036**, Q1, MNiSW points: **100**.

[A3] Camerlink, I., & Turner, S. P. (2017). Farmers’ perception of aggression between growing pigs. *Applied Animal Behaviour Science*, 192, 42-47. <https://doi.org/10.1016/j.applanim.2016.11.009> Impact factor: **1.548**, Q1, MNiSW points: **100**.

[A4] Camerlink, I., Peijnenburg, M., Wemelsfelder, F., Turner, S.P. (2016). Emotions and physiology after victory or defeat assessed through Qualitative Behavioural Assessment, skin lesions and blood parameters in pigs. *Applied Animal Behaviour Science*, 183, 28-34. <https://doi.org/10.1016/j.applanim.2016.07.007> Impact factor: **1.771**, Q1, MNiSW points: **100**.

[A5] Camerlink, I., Coulange, E., Baxter, E.M., Turner, S.P. (2018) Facial expression as a potential measure of both intent and emotion. *Scientific Reports*, 8(1), 17602. <https://doi.org/10.1038/s41598-018-35905-3> Impact factor: **4.011**, Q1, MNiSW points: **140**.

[A6] Camerlink, I., Arnott, G., Farish, M., Turner, S.P. (2016). Complex contests and the influence of aggressiveness in pigs. *Animal Behaviour* 121, 71-78. <https://doi.org/10.1016/j.anbehav.2016.08.021> Impact factor: **2.869**, Q1, MNiSW points: **140**.

[A7] Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2015). Aggressiveness as a component of fighting ability in pigs using a game-theoretical framework. *Animal Behaviour*, 108, 183-191. <https://doi.org/10.1016/j.anbehav.2015.07.032> Impact factor: **3.169**, Q1, MNiSW points: **140**.

[A8] Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2017). The influence of experience on contest assessment strategies. *Scientific Reports*, 7(1), 14492. <https://doi.org/10.1038/s41598-017-15144-8> Impact factor: **4.122**, Q1, MNiSW points: **140**.

[A9] Camerlink, I., Menneson, S., Turner, S. P., Farish, M., & Arnott, G. (2018). Lateralization influences contest behaviour in domestic pigs. *Scientific Reports*, 8(1), 12116. <https://doi.org/10.1038/s41598-018-30634-z> Impact factor: **4.011**, Q1, MNiSW points: **140**.

[A10] Camerlink, I., Chou, J. Y., & Turner, S. P. (2020). Intra-Group Lethal Gang Aggression in Domestic Pigs (*Sus scrofa domesticus*). *Animals*, 10(8), 1287. <https://doi.org/10.3390/ani10081287> Impact factor: **2.323**, Q1, MNiSW points: **100**.

[A11] Portele, K., Scheck, K., Siegmann, S., Feitsch, R., Maschat, K., Rault, J. L., & Camerlink, I. (2019). Sow-Piglet Nose Contacts in Free-Farrowing Pens. *Animals*, 9(8), 513. <https://doi.org/10.3390/ani9080513> Impact factor: **2.323**, Q1, MNiSW points: **100**.

[A12] Camerlink, I., & Ursinus, W. W. (2020). Tail postures and tail motion in pigs: A review. *Applied Animal Behaviour Science*, 105079. <https://doi.org/10.1016/j.applanim.2020.105079> Impact factor: **2.187**, Q1, MNiSW points: **100**.

II. INFORMATION ON SCIENTIFIC OR ARTISTIC ACTIVITY

1. List of published scientific monographs (including the monographs not mentioned in section I.1).

Camerlink, I. (2020). *Animal Welfare in Practice: Pigs*. Sheffield: 5m Publishing. ISBN 978-1789181050

Camerlink, I. (2014). *Sociable swine: indirect genetic effects on growth rate and their effect on behaviour and production of pigs in different environments*. PhD dissertation, Wageningen University. ISBN 978-94-6173-955-1

2. List of published chapters in scientific monographs.

Book chapters in edited books

Camerlink, I. (2020). The profits of improving pig welfare. In: I. Camerlink (Ed.). *Pigs: Welfare in Practice*. Sheffield: 5m Publishing.

Camerlink, I. (2020). Cost-benefit analysis: gilt rearing. In: I. Camerlink (Ed.). *Pigs: Welfare in Practice*. Sheffield: 5m Publishing.

Turner, S.P., Camerlink, I., Baxter, E., D'Eath, R.B., Desire, S. and Roehe, R. (2017). Breeding for pig welfare; opportunities and challenges. In: *Advances in Pig Welfare*. Edited by Spinka, M. Elsevier, Woodhead Publishing, London.

3. Information about membership in editorial boards preparing scientific monographs for publication.

Book Editor

Series Editor on the book 'Pigs: Welfare in Practice' for international publisher 5m Publishing. Book published in 03/2020.

Preparation of an edited book for international publisher CABI. Expected publication date in 2021

Preparation of an edited book for international publisher Elsevier. Expected publication date in 2023

4. List of articles published in scientific journals (including the articles not mentioned in section I.2).

The journal impact factor and journal Q-score are retrieved from Web of Science (InCites) for the year of the publication. The citation numbers were retrieved from Scopus on 21/20/2020.

Peer-reviewed publications in scientific journals (2015 – 2020: after attainment of PhD degree)

1. Camerlink, I., & Ursinus, W. W. (2020). Tail postures and tail motion in pigs: A review. *Applied Animal Behaviour Science*, 105079. Impact factor: 2.187, Q1, MNiSW points: 100. Citations: 0.
2. Oldham, L., Camerlink, I., Arnott, G., Doeschl-Wilson, A., Farish, M., & Turner, S. P. (2020). Winner–loser effects overrule aggressiveness during the early stages of contests between pigs. *Scientific Reports*, 10(1), 1-13. Impact factor: 3.998, Q1, MNiSW points: 140. Citations: 0.
3. Camerlink, I., Chou, J. Y., & Turner, S. P. (2020). Intra-Group Lethal Gang Aggression in Domestic Pigs (*Sus scrofa domesticus*). *Animals*, 10(8), 1287. Impact factor: 2.323, Q1, MNiSW points: 100. Citations: 0.
4. Ko, H. L., Chong, Q., Escribano, D., Camerlink, I., Manteca, X., & Llonch, P. (2020). Pre-weaning socialization and environmental enrichment affect life-long response to regrouping in commercially-reared pigs. *Applied Animal Behaviour Science*, 105044. Impact factor: 2.187, Q1, MNiSW points: 100. Citations: 0.
5. Rault, J. L., Hintze, S., Camerlink, I., & Yee, J. R. (2020). Positive welfare and the like: Distinct views and a proposed framework. *Frontiers in Veterinary Science*, 7, 370. Impact factor: 2.245, Q1, MNiSW points: 70. Citations: 1; without self-citations: 1.
6. Weller, J. E., Turner, S. P., Farish, M., Camerlink, I., & Arnott, G. (2020). The association between play fighting and information gathering during subsequent contests. *Scientific reports*, 10(1), 1-9. Impact factor: 3.998, Q1, MNiSW points: 140. Citations: 0.
7. Wurtz, K., Camerlink, I., D'Eath, R.B., Peña Fernández, A., Norton, T., Steibel, J., Siegford, J. (2019) Recording behaviour of indoor-housed farm animals automatically using machine vision technology: A systematic review. *PloS one*, 14(12): e0226669. Impact factor: 2.740, Q2, MNiSW points: 100. Citations: 4; without self-citation: 4.
8. Peden, R. S., Camerlink, I., Boyle, L. A., Loughnan, S., Akaichi, F., & Turner, S. P. (2020). Belief in Pigs' Capacity to Suffer: An Assessment of Pig Farmers, Veterinarians, Students, and Citizens. *Anthrozoös*, 33(1), 21-36. Impact factor: 1.511, Q2, MNiSW points: 100. Citations: 0.
9. Prunier, A., Averos, X., Dimitrov, I., Edwards, S., Hillmann, E., Holinger, M., . . . Camerlink, I. (2019). Review: Early life predisposing factors for biting in pigs. *Animal*, 14(3), 570-587. Impact factor: 2.400, Q1, MNiSW points: 200. Citations: 3; without self-citations: 2.
10. Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2019). Advantages of social skills for contest resolution. *Royal Society Open Science*, 6(5), 181456. Impact factor: 2.647, Q2, MNiSW points: 100. Citations: 4; without self-citations: 0.
11. Weller, J. E., Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2019). Playful pigs: early life play-fighting experience influences later life contest dynamics. *Animal Behaviour*, 158, 269-279. Impact factor: 2.689, Q1, MNiSW points: 140. Citations: 2; without self-citations: 2.
12. Boileau, A., Farish, M., Turner, S. P., & Camerlink, I. (2019). Infrared thermography of agonistic behaviour in pigs. *Physiology & Behavior*, 210, 112637. Impact factor: 2.826, Q2, MNiSW points: 70. Citations: 3; without self-citations: 3.

13. Chou, J. Y., O'Driscoll, K., D'Eath, R. B., Sandercock, D. A., & Camerlink, I. (2019). Multi-step tail biting outbreak intervention protocols for pigs housed on slatted floors. *Animals*, 9(8), 582. Impact factor: 2.323, Q1, MNIsw points: 100. Citations: 4; without self-citations: 4.
14. Portele, K., Scheck, K., Siegmann, S., Feitsch, R., Maschat, K., Rault, J. L., & Camerlink, I. (2019). Sow-piglet nose contacts in free-farrowing pens. *Animals*, 9(8), 513. Impact factor: 2.323, Q1, MNIsw points: 100. Citations: 1; without self-citations: 1.
15. Peden, R. S. E., Akaichi, F., Camerlink, I., Boyle, L. A., & Turner, S. P. (2019). Pig farmers' willingness to pay for management strategies to reduce aggression between pigs. *PloS one*, 14(11), e0224924-e0224924. Impact factor: 2.740, Q2, MNIsw points: 100. Citations: 0.
16. Peden, R. S., Camerlink, I., Boyle, L. A., Akaichi, F., & Turner, S. P. (2019). Farmer perceptions of pig aggression compared to animal-based measures of fight outcome. *Animals*, 9(1), 22. Impact factor: 2.323, Q1, MNIsw points: 100. Citations: 2; without self-citations: 0.
17. Peden, R., Akaichi, F., Camerlink, I., Boyle, L., & Turner, S.P. (2019). Factors influencing farmer willingness to reduce aggression between pigs. *Animals*, 9(1), 6. Impact factor: 2.323, Q1, MNIsw points: 100. Citations: 9; without self-citations: 7.
18. Weller, J. E., Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2019). Socialisation and its effect on play behaviour and aggression in the domestic pig (*Sus scrofa*). *Scientific Reports*, 9(1), 4180. Impact factor: 3.998, Q1, MNIsw points: 140. Citations: 6; without self-citations: 2.
19. Sun, D., Jin, X., Camerlink, I., Tong, M., Su, J., Zhao, F., ... & Shi, B. (2019). Effects of *Yucca schidigera* extract on growth performance and antioxidative function of small intestine in broilers. *Journal of Animal Physiology and Animal Nutrition*, 103(3), 738-746. Impact factor: 1.597, Q2, MNIsw points: 70. Citations: 1; without self-citations: 1.
20. Camerlink, I., Coulange, E., Baxter, E.M., Turner, S.P. (2018) Facial expression as a potential measure of both intent and emotion. *Scientific Reports*, 8(1), 17602. Impact factor: 4.011, Q1, MNIsw points: 140. Citations: 8; without self-citations: 7.
21. Camerlink, I., Menneson, S., Turner, S. P., Farish, M., & Arnott, G. (2018). Lateralization influences contest behaviour in domestic pigs. *Scientific Reports*, 8(1), 12116. Impact factor: 4.011, Q1, MNIsw points: 140. Citations: 5; without self-citations: 5.
22. Camerlink, I., Farish, M., D'Eath, R., Arnott, G., & Turner, S. (2018). Long term benefits on social behaviour after early life socialization of piglets. *Animals*, 8(11), 192. Impact factor: 1.832, Q1, MNIsw points: 100. Citations: 6; without self-citations: 2.
23. Camerlink, I., Ursinus, W. W., Bartels, A. C., Bijma, P., & Bolhuis, J. E. (2018). Indirect genetic effects for growth in pigs affect behaviour and weight around weaning. *Behavior Genetics*, 48(5), 413-420. Impact factor: 2.313, Q3, MNIsw points: 70. Citations: 2; without self-citations: 2.
24. Peden, R. S., Turner, S. P., Boyle, L. A., & Camerlink, I. (2018). The translation of animal welfare research into practice: the case of mixing aggression between pigs. *Applied Animal Behaviour Science*, 204, 1-9. Impact factor: 1.817, Q1, MNIsw points: 100. Citations: 32; without self-citations: 17.
25. Yang, C. H., Ko, H. L., Salazar, L. C., Llonch, L., Manteca, X., Camerlink, I., & Llonch, P. (2018). Pre-weaning environmental enrichment increases piglets' object play behaviour on a large scale commercial pig farm. *Applied Animal Behaviour Science*, 202, 7-12. Impact factor: 1.817, Q1, MNIsw points: 100. Citations: 12; without self-citations: 10.
26. Salazar, L. C., Ko, H. L., Yang, C. H., Llonch, L., Manteca, X., Camerlink, I., & Llonch, P. (2018). Early socialisation as a strategy to increase piglets' social skills in intensive farming conditions.

- Applied Animal Behaviour Science*, 206, 25-31. Impact factor: 1.817, Q1, MNI_{SW} points: 100. Citations: 10; without self-citations: 5.
27. Turner, S. P., Nevison, I. M., Desire, S., Camerlink, I., Roehe, R., Ison, S. H., ... & D'Eath, R. B. (2017). Aggressive behaviour at regrouping is a poor predictor of chronic aggression in stable social groups. *Applied Animal Behaviour Science* 191, 98–106. Impact factor: 1.548, Q1, MNI_{SW} points: 100. Citations: 8; without self-citations: 5.
28. Camerlink, I., & Turner, S. P. (2017). Farmers' perception of aggression between growing pigs. *Applied Animal Behaviour Science*, 192, 42-47. Impact factor: 1.548, Q1, MNI_{SW} points: 100. Citations: 9; without self-citations: 3.
29. Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2017). The influence of experience on contest assessment strategies. *Scientific Reports*, 7(1), 14492. Impact factor: 4.122, Q1, MNI_{SW} points: 140. Citations: 16; without self-citations: 8.
30. Camerlink, I., Arnott, G., Farish, M., Turner, S.P. (2016). Complex contests and the influence of aggressiveness in pigs. *Animal Behaviour* 121, 71-78. Impact factor: 2.869, Q1, MNI_{SW} points: 140. Citations: 21; without self-citations: 13.
31. Camerlink, I., Reimert, I., Bolhuis, J.E. (2016). Intranasal oxytocin administration in relationship to social behaviour in domestic pigs. *Physiology & Behavior* 163, 51-55. Impact factor: 2.341, Q2, MNI_{SW} points: 70. Citations: 5; without self-citations: 5.
32. Camerlink, I., Peijnenburg, M., Wemelsfelder, F., Turner, S.P. (2016). Emotions and physiology after victory or defeat assessed through Qualitative Behavioural Assessment, skin lesions and blood parameters in pigs. *Applied Animal Behaviour Science*, 183, 28-34. Impact factor: 1.771, Q1, MNI_{SW} points: 100. Citations: 11; without self-citations: 8.
33. Iversen, M.W., Bolhuis, J.E., Camerlink, I., Ursinus, W.W., Reimert, I., Duijvesteijn, N. (2016). Heritability of the backtest response in piglets and its genetic correlations with production traits. *Animal*, 11(4), 556-563. Impact factor: 1.921, Q1, MNI_{SW} points: 200. Citations: 5; without self-citations: 4.
34. Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2015). Aggressiveness as a component of fighting ability in pigs using a game-theoretical framework. *Animal Behaviour*, 108, 183-191. Impact factor: 3.169, Q1, MNI_{SW} points: 140. Citations: 27; without self-citations: 17.
35. Turner, S. P., Weller, J. E., Camerlink, I., Arnott, G., Choi, T., Doeschl-Wilson, A., ... & Foister, S. (2020). Play fighting social networks do not predict injuries from later aggression. *Scientific Reports*, 10(1), 1-16. Impact factor: 3.998, Q1, MNI_{SW} points: 140. Citations: 0.

Peer-reviewed publications in scientific journals (2010 – 2014: before attainment of PhD degree)

36. Camerlink, I., Ursinus, W. W., Bijma, P., Kemp, B., Bolhuis, J. E. (2014). Indirect genetic effects for growth rate in domestic pigs alter aggressive and manipulative biting behaviour. *Behavior Genetics*, 45(1), 117-126. Impact factor: 3.210, Q1, MNiSW points: 70. Citations: 31; without self-citations: 28.
37. Camerlink, I., Turner, S. P., Ursinus, W. W., Reimert, I., Bolhuis, J. E. (2014). Aggression and affiliation during social conflict in pigs. *PloS one*, 9(11), e113502. Impact factor: 3.234, Q1, MNiSW points: 100. Citations: 9; without self-citations: 8.
38. Camerlink, I., Bolhuis, J. E., Duijvesteijn, N., van Arendonk, J. A. M., Bijma, P. (2014). Growth performance and carcass traits in pigs selected for indirect genetic effects on growth rate in two environments. *Journal of Animal Science* 92(6), 2612-2619. Impact factor: 2.108, Q1, MNiSW points: 70. Citations: 10; without self-citations: 6.
39. Camerlink, I., Ursinus, W. W., Bolhuis, J. E. (2014). Struggling to survive: early life challenges in relation to the backtest in pigs. *Journal of Animal Science*, 92(7), 3088-3095. Impact factor: 2.108, Q1, MNiSW points: 70. Citations: 4; without self-citations: 3.
40. Ellen, E.D., Rodenburg, T.B., Albers, G.A., Bolhuis, J.E., Camerlink, I., Duijvesteijn, N., ... & Bijma, P. (2014). The prospects of selection for social genetic effects to improve welfare and productivity in livestock. *Frontiers in Genetics* 5, 377. Impact factor: 3.789, Q2, MNiSW points: 100. Citations: 40; without self-citations: 38.
41. Duijvesteijn, N., Benard, M., Reimert, I., Camerlink, I. (2014) Same pig, different conclusions: stakeholders differ in qualitative behaviour assessment. *Journal of Agricultural and Environmental Ethics*, 27(6), 1019-1047. Impact factor: 0.935, Q1, MNiSW points: 70. Citations: 15; without self-citations: 12.
42. Camerlink, I., Turner, S.P., Bijma, P., Bolhuis, J.E. (2013) Indirect genetic effects and housing conditions change aggressive behaviour in pigs. *Plos One* 8(6), e65136. Impact factor: 3.534, Q1, MNiSW points: 100. Citations: 42; without self-citations: 34.
43. Camerlink, I., Turner, S.P. (2013) The pig's nose and its role in dominance relationships and harmful behaviour. *Applied Animal Behaviour Science* 145, 84–91. Impact factor: 1.626, Q1, MNiSW points: 100. Citations: 26; without self-citations: 24.
44. Reimert, I., Rodenburg, T.B., Ursinus, W.W., Duijvesteijn, N., Camerlink, I., Kemp, B., Bolhuis, J.E. (2013) Backtest and novelty behavior of female and castrated male piglets, with diverging social breeding values for growth. *Journal of Animal Science* 91, 4589-4597. Impact factor: 1.920, Q1, MNiSW points: 70. Citations: 21; without self-citations: 16.
45. Camerlink, I., Bijma, P., Kemp, B., Bolhuis, J.E. (2012) Relationship between growth rate and oral manipulation, social nosing, and aggression in finishing pigs. *Applied Animal Behaviour Science* 142, 11–17. Impact factor: 1.497, Q1, MNiSW points: 100. Citations: 31; without self-citations: 25.
46. Camerlink, I., Ellinger, L., Bakker, E.J., Lantinga, E.A. (2010) Homeopathy as replacement to antibiotics in the case of *Escherichia coli* diarrhoea in neonatal piglets. *Homeopathy* 99(1), 57–62. Impact factor: 1.000, Q3, MNiSW points: 70. Citations: 29; without self-citations: 29.

5. List of project, engineering and design as well as technological achievements (including the achievements not mentioned in section I.3).

Project ‘Understanding assessment strategies during aggressive encounters in pigs to improve welfare following regrouping’ (2014-2017). This project focused on aggressive behaviour between pigs and how aggressiveness as a personality trait affects their fighting ability. The project has up to now resulted in 15 peer-reviewed publications in reputable international journals, and 13 peer-reviewed conference abstracts, and the number is still counting. The data from the project has been used for 3 PhD projects and has supplied at least 7 student projects. During the time of the project I have received two international awards based on my work, namely the Young Investigator Award of the International Society of Aggression (2015), and the Young Investigator Award of the International Society for Applied Ethology (2017).

Project ‘Animal Welfare Advocacy in China’ (2017-2018). This project aimed to improve animal welfare in China through stakeholder meetings and workshops. For this project I spend two times several weeks in various parts of China to visit researchers at different universities, visit farms and to speak with animal welfare organisations. The project has resulted in flyer on pig welfare for farmers and several technical publications in farmer magazines. It has also provided me with a wide network in China, which sees continued collaboration.

Project ‘Inter- and intraspecific social bonds (2018-2020). This project was terminated midway due to taking a new job position in Poland. The project focused on social bonds in pigs and its effects on their health and behaviour. The project so far has 2 peer-reviewed publications, and 2 peer-reviewed conference abstracts. Three more publications are currently in preparation. The project has provided 9 students with learning opportunities. Just after the project, I received the prestigious UFAW Young Animal Welfare Scientists of the Year Award.

6. List of public realizations of works of art (including the works not mentioned in section I.3).

Not applicable

7. Information on presentations given at national or international scientific or arts conferences, including a list of lectures delivered upon invitation and plenary lectures.

Plenary lectures

Plenary lecture at the 53rd congress of the International Society of Applied Ethology (ISAE), 5-9/8/2019, Bergen, Norway

Invited Speaker at the COST Action GroupHouseNet stakeholder meeting, 11-12/06/2019, Ljubljana, Slovenia

Plenary lecture (Invited speaker) at the 6th International Yak Conference, 27-30/08/2018, Xining, Qinghai Province, China

Peer-reviewed conference abstracts (2015 – 2020: **after attainment of PhD degree**)

1. Camerlink, I (2020) The importance of micro-expressions to animals’ social interactions. Recent advances in animal welfare science VII, Virtual UFAW Animal Welfare Conference. 30/06 – 1/07/2020.

2. Oldham, L., Wemelsfelder, F., Camerlink, I., Farish, M., Arnott, G., Doeschl-Wilson, A., Turner, S.P. (2020) Emotional expressivity of pigs in a contest setting reflects their prior contest outcome and aggressiveness. *Animal Behavior Society Virtual Conference*, 28-31/07/2020.
3. Camerlink, I., Nielsen, B.L., Windschnurer, I., Vigors, B. (2020) Effects of the COVID-19 pandemic on animal behaviour and welfare researchers. *1st Virtual Congress of the International Society for Applied Ethology (ISAE)*, 6-7/08/2020
4. Proßegger, C., Kubala, D., Galunder, K., Rault, J.-L., Camerlink, I. (2020) Social behaviour in pigs: are siblings nicer to each other than to strangers? *1st Virtual Congress of the International Society for Applied Ethology (ISAE)*, 6-7/08/2020
5. Rault, J.-L., Camerlink, I., Goumon, S., Špinko, M. (2020) Development of the joint-log-lift task in pigs: hints on cooperation? *1st Virtual Congress of the International Society for Applied Ethology (ISAE)*, 6-7/08/2020
6. Wurtz, K., Camerlink, I., D'Eath, R.B., Peña Fernández, A., Siegford, J., Steibel, J. (2019) Automated phenotyping of swine behaviour using image analysis: A systematic review. *9th European Conference on Precision Livestock Farming*, 26-29/08/2019, Cork, Ireland.
7. Camerlink, I. (2019) New perspectives for assessing the valence of social interactions. In *53rd Congress of the International Society for Applied Ethology (ISAE)*, Bergen, Norway, 08/2019.
8. Chou, J. Y., O'Driscoll, K., D'Eath, R. B., Sandercock, D. A., & Camerlink, I. (2019). Using experimental data to evaluate the effectiveness of tail biting outbreak intervention protocol. In *53rd Congress of the International Society for Applied Ethology (ISAE)*, Bergen, Norway, 08/2019.
9. De Haas, E.N., Camerlink, I., Edwards, S., Prunier, A., Averos, A., ... & Janczak, A. (2019) Trends in early life conditions of pigs and laying hens in order to prevent damaging behaviour: a GroupHouseNet update. In *53rd Congress of the International Society for Applied Ethology (ISAE)*, Bergen, Norway, 08/2019.
10. Peden, R.S, Camerlink, I., Boyle, L., Akaichi, F., Turner, S.P. (2019) Farmer perceptions of pig aggression compared to animal-based measures of fight outcome. In *53rd Congress of the International Society for Applied Ethology (ISAE)*, Bergen, Norway, 08/2019.
11. Turner, S.P, Weller, J.E., Camerlink, I., Arnott, G., Choi, T., Doeschl-Wilson, A., Farish, M., Foister, S. (2019). Play fighting social network position does not predict injuries from later aggression between pigs. In *53rd Congress of the International Society for Applied Ethology (ISAE)*, Bergen, Norway, 08/2019.
12. Peden, R.S., Akaichi, F., Camerlink, I., Boyle, L., Turner, S.P. (2019). Factors influencing farmer willingness to reduce aggression between pigs. In *53rd Congress of the International Society for Applied Ethology (ISAE)*, Bergen, Norway, 08/2019.
13. Camerlink, I., Farish, M., Arnott, G., Turner, S.P. (2017) Intensity of aggression in pigs depends on their age and experience at testing. *Proceedings ISAE Aarhus, Denmark*, 08/2017.
14. Salazar, L., Camerlink, I., Ko, H.L., Yang, C.H., Lonch, P. (2017) The effect of socialization before weaning on social behaviour and performance in piglets (*Sus scrofa*) at a commercial farm. *Proceedings ISAE Aarhus, Denmark*, 08/2017.
15. Weller, J., Turner, S.P., Camerlink, I., Farish, M., Arnott, G. (2017) Socialisation, play behaviour, and the development of aggression in domestic pigs (*Sus scrofa*). *Proceedings ISAE Aarhus, Denmark*, 08/2017.

16. Peden, R.S., Turner, S.P., Camerlink, I., Boyle, L. (2017) Farmers' perception of pig aggression and factors limiting welfare improvements. Proceedings ISAE Aarhus, Denmark, 08/2017.
17. Yang, CH., Ko, HL., Salazar, L., Camerlink, I., Llonch, P. (2017) Pre-weaning environmental enrichment increases play behaviour in piglets (*Sus scrofa*) at a large scale commercial pig farm. Proceedings ISAE Aarhus, Denmark, 08/2017.
18. Camerlink, I., Arnott, G., Turner, S.P. (2016). Personality and sex; key determinants of the duration and intensity of aggression between pigs. ISAE Edinburgh, UK, 07/2016.
19. Camerlink, I., Turner, S.P., Arnott, G. (2016) Aggression as an applied welfare problem studied through a game theoretical approach. 22nd ISRA World congress, Sydney, Australia, 07/2016.
20. Menneson, S., Turner, S.P., Arnott, G., Camerlink, I. (2016). Lateralization during agonistic behaviour in pigs. ISAE Edinburgh, 07/2016.
21. Camerlink, I., Turner, S.P., Farish, M., Arnott, G. (2015). Aggressive personality as a component of fighting ability, Proceedings of the 34th International Ethological Conference, 9-14/08/2015, Cairns, Australia.
22. Camerlink, I., Turner, S.P., Farish, M., Arnott, G. (2015). Freedom to express agonistic behaviour can reduce escalated aggression between pigs. Proceedings of the 49th Congress of the International Society for Applied Ethology, 14-17/09/2015, Sapporo, Japan, p. 84.
23. Camerlink, I., Sarramia, L., Turner, S.P. (2015). Third-party aggressive interactions between newly grouped pigs. Proceedings of the UK Ireland Regional Meeting, 11/11/2015, Cork, Ireland.
24. Camerlink, I., Arnott, G., Farish, M. and Turner, S.P. (2015). How to solve a conflict without getting into a fight. Proc. International Pig Welfare Conference, Copenhagen. 29-30/04/2015.
25. Turner, S.P., Arnott, G., Farish, M. and Camerlink, I. (2015). How to solve a conflict without getting into a fight. Proceedings of the European Association for Animal Production, Warsaw, 31/08 – 4/09/2015, p384.
26. Turner, S.P., Roehe, R., Conington, J., Desire, S., Camerlink, I., D'Eath, R.B. and Dwyer, C.M. (2015). Breeding for better welfare; feasibility and consequences. Proceedings of the European Association for Animal Production, Warsaw, 31/08 – 4/09/2015, p400.

Peer-reviewed conference abstracts (2010 – 2014: before attainment of PhD degree)

27. Camerlink, I., Duijvesteijn, N., Ursinus, W.W., Bolhuis, J.E., Bijma, P. (2014) Consequences of selection for indirect genetic effect for growth in pigs on behavior and production. In: Book of Abstracts of the 10th World Congress on Genetic Applied to Livestock Production (WCGALP), 17-22/08/2014, Vancouver, Canada.
28. Camerlink, I., Duijvesteijn, N., Bolhuis, J.E., van Arendonk, J.A.M., Bijma, P. (2013) Consequences of selection for indirect genetic effects on growth for production traits in pigs. In: Book of abstracts of the 64th Annual Meeting of the European Federation of Animal Science 2013. Book of abstracts No. 19 (2013), 26–30/08/2013, p. 135.
29. Camerlink, I., Turner, S.P., Bijma, P., Bolhuis, J.E. (2013) Indirect Genetic Effects and Housing Conditions Influence Aggressive Behaviour in Pigs. In: Proceedings of the 47th congress of the International Society for Applied Ethology, 2-6/06/2013, p. 70.

30. Camerlink, I., Bijma, P., Ursinus, W.W., Bolhuis, J.E. (2012) Behaviour of finishing pigs divergently selected for social genetic effects in barren and straw-enriched pens. In: Proceedings of the 46th congress of the International Society for Applied Ethology, 31/07- 4/08/2012, p. 35.
31. Camerlink, I., Bolhuis, J.E., Bijma, P. (2012) Social interactions among finishing pigs divergently selected for social genetic effects on growth in barren and straw housing. In: Book of abstracts of the 4th International Conference on Quantitative Genetics, 17-22/06/2012, p. 161.
32. Camerlink, I., Bijma, P., Bolhuis, J.E. (2011) Improving pig welfare and production simultaneously by breeding for social genetic effects. In: Book of abstracts of the 62nd Annual Meeting of the European Federation of Animal Science 2011. Book of abstracts No. 17 (2011), 29/08 – 2/09/2011, p. 20.
33. Benard, M., Camerlink, I., Duijvesteijn, N., Reimert, I., Bijma, P., Bolhuis, J. E. (2011) Seeking a sociable swine: an interdisciplinary approach. In: Book of abstracts of the 62nd Annual Meeting of the European Federation of Animal Science 2011. Book of abstracts No. 17 (2011), 29/08 – 2/09/2011, p. 21.
34. Camerlink, I., Bergsma, R., Duijvesteijn, N., Bolhuis, J.E., Bijma, P. (2010) Consequences of selection for social genetic effects on ADG in Finishing Pigs - A pilot study. In: Book of Abstracts of the 9th World Congress on Genetic Applied to Livestock Production (WCGALP), 1-6/08/2010, Leipzig, Germany.

8. Information on participation in organizational and scientific committees at national or international conferences, including the applicant's function.

Member of the scientific committee of the International Conference of the International Society for Applied Ethology (ISAE), the 1st Virtual Conference, 6-7/08/2020.

Member of the organizing committee of the International Conference of the International Society for Applied Ethology (ISAE), Edinburgh, UK, 12-15/07/2016

9. Information on participation in the works of research teams realizing projects financed through national and international competitions, including the projects which have been completed and projects in progress, and information on the function performed in the team.

Realized projects

Understanding assessment strategies during aggressive encounters in pigs to improve welfare following regrouping (2014 – 2018). Involved as project manager; Funded by the Biotechnology and Biological Sciences Research Council (BBSRC).

Demand driven solutions to reduce aggression between pigs (2016 – 2020). Involved as co-applicant and co-supervisor of the PhD student (Dr Rachel Peden). Collaboration between Scotland's Rural College (SRUC), UK and Teagasc, Ireland. PhD scholarship funded by Scotland's Rural College (SRUC), UK.

Implementing phenomics and genomics analyses of behavioral traits to reduce aggression in group housed pigs (2017-2020). Involved as co-applicant. Collaboration between Michigan State University, USA and Scotland's Rural College (SRUC), UK. Funded by the United States Department of Agriculture (USDA).

Farm Animal Welfare Advocacy in China (2016 – 2018). Involved as co-applicant. Collaboration between The Jeanne Marchig International Centre for Animal Welfare Education, Royal (Dick) School

of Veterinary Studies, The University of Edinburgh and SRUC. Funded by the Open Philanthropy Project.

Grouphouseset ‘Synergy for preventing damaging behaviour in group housed pigs and chickens’ (2017 – 2020). Involved as participant, and in the last year as council member. Funded by EU COST Action.

Ongoing projects

Determining how cognitive ability and affective state impact assessment strategies during aggressive contests to improve pig welfare after regrouping (2018 - 2022). Involved as co-applicant and co-supervisor of the PhD student (Lucy Oldham). Collaboration between Scotland’s Rural College (SRUC), UK and Queen’s University Belfast, UK. PhD scholarship funded by Scotland’s Rural College (SRUC), UK.

10. Membership in international or national organizations and scientific societies, including the functions performed by the applicant.

Member of the International Society of Applied Ethology (ISAE) since 2011, Junior Editor from 2017-2019, Senior Editor from 2019-2021.

Member of The Association for the Study of Animal Behaviour (ASAB) since 2019

Member of the Universities Federation for Animal Welfare (UFAW) since 2020

11. Information on internships completed in scientific or artistic institutions, also abroad, including the place, time and duration of the internship and its character.

During my employment at SRUC, UK, I visited Universitat Autònoma de Barcelona (UAB), Spain, from 14-29 September 2017, on an ERASMUS grant for researchers. The visit was hosted by Prof Xavier Manteca and Dr Pol Llonch. The two week visit was characterised by collaborative research, guest lectures and to site visits to see the research facilities. The visit has resulted in a durable collaboration, which is evidenced by multiple co-authored research publications.

12. Membership in editorial committees and scientific boards of journals, including the functions performed by the applicant (e.g. editor-in-chief, chairman of scientific board etc.).

Editorial Board member for *Scientific Reports (Nature)* since 2018. Handling editor of manuscripts

Senior Editor of International Society of Applied Ethology (ISAE) (Junior Editor from 2017-2019); Guest Editor *Applied Animal Behaviour Science* since 2019. Handling editor of manuscripts

Review Editor for *Frontiers in Veterinary Sciences – Animal Behaviour and Welfare*, since 9/12/2019. Reviewer in the Editorial Board.

13. Information on scientific or artistic works reviewed, in particular those published in international journals.

In the years 2015-2020 I was reviewer of at least 42 scientific papers submitted for publication in international scientific journals, for the following international journals (number of reviewed manuscripts between brackets):

Scientific Reports (11), Animal Behaviour (1), Royal Society Open Science (1), Journal of Animal Science (1), Applied Animal Behaviour Science (5), Animal (1), Animals (7), Animal Genetics (1),

Translational Animal Science (1), Sustainability (1), Information Processing in Agriculture (1), Acta Veterinaria Scandinavica (1), Agriculture (3), Animal Science Journal (1), Behavioural Processes (1), Current Zoology (1), Frontiers in Veterinary Sciences (3), Veterinary and Animal Sciences (1)

14. Information on participation in European or other international programmes.

Member of COST Action GrouphouseNet 'Synergy for preventing damaging behaviour in group housed pigs and chickens'. The COST Action closed 03/2020.

I am currently initiator and co-applicant of a newly submitted EU COST Action 'Positive farm animal welfare'. For this proposal a consortium of 30 researchers from 24 different countries are collaborating. The outcome of this proposal will be known in 2021.

15. Information on participation in research teams realizing projects other than those defined in section II.9.

A continued research collaboration, irrespective of funding, is established with Simon Turner (SRUC, Edinburgh, UK), Gareth Arnott (Queen's University, Belfast, UK), Pol Llonch (UAB, Barcelona, Spain), Jean-Loup Rault (University of Veterinary Medicine, Vienna, Austria), Jen-Yun Chou (USA) and Rachel Peden (Newcastle University, Newcastle, UK). These research collaborations involve projects for writing scientific publications.

Further active research collaboration is on-going for the writing and publication of Edited books on which I am the main Editor. This includes being Editor on a book for international publisher CABI, and being Editor, together with Dr Emma Baxter (SRUC, Edinburgh, UK) for the second edition of the book *Advances in Pig Welfare*, for international publisher Elsevier.

16. Information on membership in the teams assessing applications for financing of research projects, applications for scientific awards, applications in other competitions of scientific or didactic character.

I have been reviewing a grant proposal application for the Biotechnology and Biological Sciences Research Council (BBSRC), the largest UK public funder of non-medical bioscience.

From 2017 onward I have been in the reviewing committee of the ISAE to evaluate the abstracts submitted to the yearly international conference. As former recipient of the ISAE Young Investigator Award, I have been in the selection committee in 2018.

III. INFORMATION ON COOPERATION WITH SOCIAL AND ECONOMIC ENVIRONMENT

1. List of technological works.

Publications in technical magazines (2015 – 2020: after attainment of PhD degree)

1. Camerlink, I. & Peden, R.S.E. (2020) How to make financial decisions. The Pig Site, 01/2020.
2. Camerlink, I. & Chou, J-Y (2019) What to do when tail biting occurs? PigProgress 12/2019.
3. Camerlink, I. (2019). Weighing up the costs and benefits of co-mingling piglets before weaning. The Pig Site, 10/2019.
4. Camerlink, I. (2019). Straw or no straw? That's the question. PigProgress September 2019
5. Camerlink, I. (2019). How to achieve long-term reduction in antimicrobial use in your pig herd. The Pig Site, 08/2019.
6. Camerlink, I. (2019). Combining pigs with crops can make sustainable sense. The Pig Site, 04/2019.
7. Camerlink, I. (2019). Smart farming revolution hits the pig sector. The Pig Site, 03/2019.
8. Camerlink, I. (2019). Extreme aggression in pigs – does it sound familiar? PigProgress 01/2019
9. Camerlink, I. (2018). Schwarze Glucksbringer (German). Agrarheute Schwein. 10/2018
10. Camerlink, I. (2018). The profits of good mothers. The Pig Site. 10/2018
11. Camerlink, I. (2018). Top tips for reducing aggression in sows and boars. The Pig Site. 10/2018.
12. Camerlink, I. (2018). How to deal with pig tail docking and biting? PigProgress 09/2018
13. Camerlink, I, Hov-Martinsen, K, Aasmundstad, T, Rodenburg, B, Prunier, A, Valros, AE, Janczak, A. (2018). How to deal with pig tail docking and biting? Pig Progress, 09/2018.
14. Camerlink, I. (2018). Future looks bright for better pig welfare in China. PigProgress, 05/2018.
15. Camerlink, I., Ter Beek, V. (2017) Why avoid aggression between pigs. Pig Progress, 05/2017

Publications in technical magazines (2010 – 2015: before attainment of PhD degree)

16. Ter Beek, V., Camerlink, I. (2013). A revolution in thinking about pig tails. Pig Progress, 06/2013
17. Lamers, J., Ursinus, W.W., Camerlink, I. (2012). Damage due to unnoted biting (Dutch). Varkens 76, 34.
18. Lamers, J., Camerlink, I., Duijvesteijn, N. (2012). Sharing results and listening to experiences (Dutch). Varkens 76, 7.
19. Lamers, J., Duijvesteijn, N., Camerlink, I. (2012). Asocial pig influences others (Dutch). Varkens 76, 34.
20. Lamers, J., Camerlink, I. (2012). Boar behaviour remains persistent (Dutch). Varkens 76, 35.
21. Rotgers, G., Benard, M., Camerlink, I., Duijvesteijn, N., Reimert, I. (2012). Pig farmer and researcher distrust each other (Dutch). V-focus 9.

2. Information on cooperation with economic sector.

Cooperation with the economic sector has mainly been through working as a freelance writer for various technical magazines meant for farmers, and through the organisation of stakeholder meetings. In 2018, I was invited by international pig breeding company PIC to be a speaker at their webinar. In 2015, I organised a stakeholder meeting with representatives of pig industry in UK.

Before the attainment of my PhD degree, I organised a stakeholder workshop for pig farmers, industry (feed companies, veterinarians, pig breeding organisation), and government representatives in 2013 and 2012. Both meetings were organised in The Netherlands and had each 30-40 participants.

3. Obtaining the right of industrial property, including the national or international patents granted.

Not applicable

4. Information on implemented technologies.

Not applicable

5. Information on performed expert analyses or other studies prepared on request of public institutions or entrepreneurs.

Not applicable

6. Information on participation in expert and competition teams.

Not applicable

7. Information on artistic projects realized in non-artistic environment.

Not applicable

IV. SCIENTOMETRIC INFORMATION

1. Information on the Impact Factor (in the fields and disciplines in which this parameter is commonly used as a scientometric index).

Impact Factor (calculated as the sum of the number of articles published in a certain year in journal × impact factor of the journal): before attainment of PhD: 24.961 + after attainment of PhD: 86.272 = **Total IF 111.233**

2. Information on the number of citations of the applicant’s publications, including a separate list of self-citations.

Citations as indicated on Scopus on 21/10/2020: **481**. Citations without self-citations: **366**. The number of citations per publication is given in the list of publications, section II.4.

3. Information on *h*-index held.

H-index as indicated on Scopus on 21/10/2020: **12**

4. Information on the number of the points awarded by the Ministry of Science and Higher Education.

The number of points awarded by the Ministry of Science and Higher Education (MNiSW), as calculated by summing the points for all publications is **4970**. Of these, 920 points were obtained before my PhD degree, whereas 4050 points were acquired after the PhD degree. The breakdown of points is specified below.

Journal	Impact Factor 2019*	MNiSW points 2019	Publications 2010-2014 (points)	Publications 2015-2020 (points)	Total points
<i>Scientific Reports</i>	3.998	140		7 (980)	980
<i>Frontiers in Genetics</i>	3.258	100	1 (100)		100
<i>Physiology & Behavior</i>	2.826	70		2 (140)	140
<i>PloS one</i>	2.740	100	2 (200)	3 (300)	500
<i>Animal Behaviour</i>	2.689	140		3 (420)	420
<i>Royal Society Open Science</i>	2.647	100		1 (100)	100
<i>Frontiers in Veterinary Science</i>	2.245	70		1 (70)	70
<i>Animal</i>	2.400	200		2 (400)	400
<i>Animals</i>	2.323	100		6 (600)	600
<i>Behavior Genetics</i>	2.231	70	1 (70)	1 (70)	140
<i>Applied Animal Behaviour Science</i>	2.187	100	2 (200)	8 (800)	1000
<i>Journal of Animal Science</i>	2.092	70	3 (210)		210
<i>Homeopathy</i>	1.704	70	1 (70)		70
<i>Journal of Animal Physiology and Animal Nutrition</i>	1.597	70		1 (70)	70
<i>Anthrozoos</i>	1.511	100		1 (100)	100
<i>Journal of Agricultural and Environmental Ethics</i>	1.464	70	1 (70)		70
Total			920	4050	4970

* As retrieved from the InCites Journal Citation Reports of Web of Science, Clarivate Analytics.

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(Applicant's signature)

Appendix 1. Declaration of co-authors on author contributions

For articles **A1, 2, 5, and 8 - 11** the author contribution was published in the peer-reviewed article, in which the authors declared upon publication that they agreed with the content.

[A1] Author contributions as agreed upon and published in the article: All authors contributed in the design of the experiment; I.C. and M.F. carried out the animal work; I.C. carried out the statistical analyses; I.C. and G.A. wrote the manuscript; M.F. and S.P.T. helped draft the manuscript. All authors gave final approval for publication.

[A2] Author contributions as agreed upon and published in the article: Conceptualization, S.P.T., G.A., R.B.D. and I.C.; methodology, S.P.T., R.B.D., I.C. and M.F.; data collection, I.C. and M.F.; statistical analysis, I.C.; writing—original draft preparation, I.C. and S.P.T.; writing—review and editing, S.P.T., G.A., R.B.D., I.C. and M.F.; visualization, I.C. and M.F.; project administration, S.P.T.; funding acquisition, S.P.T., G.A. and R.B.D.

[A5] Author contributions as agreed upon and published in the article: I.C. designed the experiment; analysed the data, wrote the manuscript and prepared the figures; E.C. collected the data; M.F. designed and conducted the experiment, prepared the photos images and corrected the manuscript; E.M.B. contributed to writing the manuscript; S.P.T. designed the experiment, and corrected the manuscript.

[A8] Author contributions as agreed upon and published in the article: I.C.: designed and conducted the experiment; analysed data; wrote the manuscript; prepared the figures. S.P.T.: designed the experiment; corrected the manuscript. M.F.: designed and conducted the experiment. G.A.: designed the experiment; advised in data analysis; wrote the manuscript.

[A9] Author contributions as agreed upon and published in the article: I.C.: designed and conducted the experiment; analysed data; wrote the manuscript; prepared the figures. S.M.: extracted data from videos; prepared figures; S.P.T.: designed the experiment; corrected the manuscript. M.F.: designed and conducted the experiment. G.A.: designed the experiment; advised in data analysis; wrote the manuscript.

[A10] Author contributions as agreed upon and published in the article: Conceptualization, I.C. and S.P.T.; methodology, I.C.; formal analysis, I.C. and J.-Y.C.; data curation, I.C.; writing: original draft preparation, J.-Y.C. and I.C.; writing: review and editing, S.P.T. All authors have read and agreed to the published version of the manuscript.

[A11] Author contributions as agreed upon and published in the article: Conceptualization, I.C.; methodology, I.C. and J.L.R.; formal analysis, I.C. and J.L.R.; data curation, K.P., K.S., S.S., R.F. and K.M.; writing—original draft preparation, K.P., K.S., S.S., R.F. and I.C.; writing—review and editing, I.C., K.M. and J.L.R.; visualization, I.C.; supervision, I.C.


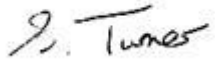
[A3]

Confirmation of author contribution

Hereby I declare that I agree with the below-mentioned author contribution statement for the publication

Camerlink, I., & Turner, S. P. (2017). Farmers' perception of aggression between growing pigs. *Applied Animal Behaviour Science*, 192, 42-47. <https://doi.org/10.1016/j.applanim.2016.11.009>

IC and SPT conceived and planned the data collection. IC carried out the survey. IC and SPT contributed to the interpretation of the results. IC took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

Author	Date	Signature
Irene Camerlink	10/9/2020	
Simon P Turner	10/09/2020	




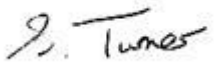
[A4]

Confirmation of author contribution

Hereby I declare that I agree with the below-mentioned author contribution statement for the publication

Camerlink, I., Peijnenburg, M., Wemelsfelder, F., Turner, S.P. (2016). Emotions and physiology after victory or defeat assessed through Qualitative Behavioural Assessment, skin lesions and blood parameters in pigs. Applied Animal Behaviour Science, 183, 28-34.
<https://doi.org/10.1016/j.applanim.2016.07.007>

IC, SPT and FW conceived and planned the data collection. MP and IC carried out the data collection. IC, SPT, FW and MP contributed to the interpretation of the results. IC took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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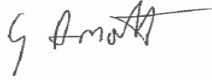

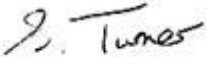
[A6]

Confirmation of author contribution

Hereby I declare that I agree with the below-mentioned author contribution statement for the publication

Camerlink, I., Arnott, G., Farish, M., Turner, S.P. (2016). Complex contests and the influence of aggressiveness in pigs. *Animal Behaviour* 121, 71-78. <https://doi.org/10.1016/j.anbehav.2016.08.021>

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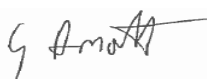

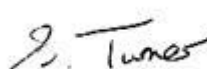
[A7]

Confirmation of author contribution

Hereby I declare that I agree with the below-mentioned author contribution statement for the publication

Camerlink, I., Turner, S. P., Farish, M., & Arnott, G. (2015). Aggressiveness as a component of fighting ability in pigs using a game-theoretical framework. *Animal Behaviour*, 108, 183-191. <https://doi.org/10.1016/j.anbehav.2015.07.032>

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[A12]

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Conceptualization: IC; literature search: IC and WWU; writing original draft preparation: IC and WWU; manuscript review and editing: IC and WWU.

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