



**Nuffield Canada**  
AGRICULTURAL SCHOLARSHIPS

# **Social License and Sustainability in the Age of the Consumer**

**Steven Wolfgram, DVM**

**February 2016**

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### **Nuffield Canada Agricultural Scholarships**

Nuffield Canada offers scholarships to agricultural leaders to expand their knowledge and network with top individuals around the world, to promote advancement and leadership in agriculture.

As part of the larger international Nuffield community which includes the United Kingdom, The Republic of Ireland, Australia, New Zealand and Zimbabwe, scholarship recipients become a member of the over 1,500 strong Nuffield alumni which interact to aid the latest scholars and continue the development of past scholars.

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2. Stand back from their day-to-day occupation and study a topic of real interest
3. Achieve personal development through travel and study
4. Deliver long-term benefits to Canadian farmers and growers, and to the industry as a whole

**Applications are due annually by April 30<sup>th</sup>**

## SCHOLAR PROFILE

I first found out about the Nuffield Scholarship on Nuffield Canada's website [www.nuffield.ca](http://www.nuffield.ca). In reading about the scholarship and some of the recent Scholars, I found I was able to relate to the passion and interest that the Scholars had for their chosen fields. As a livestock veterinarian, my main focus on a day-to-day basis has been the health and well being of livestock, specifically swine for the past twelve years. While we still deal with individual farm health issues, more and more time during farm visits is being spent on industry-wide concerns. Because of changes in public awareness and acceptability (or lack of acceptability) of some farm management practices, the food animal industry is coming under an increasing number of demands or requests for change from consumers and retailers. These include, but are not limited to changes in animal housing and welfare standards, and examining the use of antimicrobials, hormones and genetically modified organisms (GMOs) in livestock production. I looked to the Nuffield Scholarship program as a way for me to continue to grow and learn on a personal and professional level, but also to be able to make a more meaningful contribution to the broader industry.



## ACKNOWLEDGEMENTS

First and foremost, thank you to my wife Leesa, who has encouraged and supported me every step of the way on my Nuffield journey, and has shown unfailing faith in me and my abilities, even when I doubt them. You keep pushing me to step outside of my comfort zone, and I am a better person for it.

To our children, Alexandra and Sam, thank you for your patience and understanding while I was travelling and when I was writing my report.

Thank you to my parents Wally and Doris Wolfgram, who instilled a love of agriculture in me from an early age, and who, along with my sisters Sheila and Carolyn, helped out at home while I was travelling around the globe.

Thank you to Nuffield Canada Agricultural Scholarships for selecting me to be a part of this privileged group.

Many thanks to the numerous farmers, veterinarians and industry people who gave up their time, opened up their homes to me and allowed me to experience agriculture in their part of the world, especially:

Denmark	- Dr. Karl Johan Jensen and Dr. Dorte Risum from Porcus
Germany	- Dr. Friedrich Osterhoff, Andreas Karla and the staff at AhrHoff Futtergut - Dr. Alexander Bernick
Netherlands	- Annechien Ten Have Mellema, Dr. Hetty Van Beers, the staff at IKB Varken
Australia	- Dr. Ranauld Cameron and Paul Noone
Ireland	- Dr. Paul Spillane
U.K	- Jonathan Birnie and the staff at Dunbia, Helen Thoday, John Fitzgerald (Responsible Use of Medicines in Agriculture Alliance), Andrew Freemantle, Mark Williams and Giles Clifton (British Egg Industry Council), Andrew Knowles (British Pork Executive) , Zoe Davies (National Pig Association), the staff at Red Tractor Assurance

At the end of May 2014, I was privileged to travel for 6 weeks with Nuffield Scholars from Australia, France, Ireland and New Zealand for the Global Focus Program 2014 China. I want to thank my fellow scholars Aubrey, Finola, Greg, Justine, Nigel, Nikki, Paul, and Tania for making it such an enjoyable and memorable experience. I think we learned as much from each other as we did on our tours and visits.

I would also like to thank my employer, South West Ontario Veterinary Services for giving me the flexibility of scheduling to allow me to pursue this endeavour.

## SPONSORSHIP

I would like to acknowledge my sponsors, without whose financial support, this journey would not have been possible.



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## EXECUTIVE SUMMARY

Steven Wolfgram is a swine veterinarian from Stratford, Ontario. The study topic that he chose to investigate is factors that affect sustainability of food animal production in Canada – specifically, what farmers and others in the agri-food industry have to do to maintain a social license with the public. Social License is a term used for the general agreement in public that the “right thing” is being done such that no regulatory intervention is needed. On his travels, Steven met with farmers, veterinarians, and industry experts in the Netherlands, Denmark, Germany, Australia, Ireland and Great Britain to observe in action different programs for Animal Welfare and Antimicrobial use. He travelled to the United States to the Center for Food Integrity’s *Food Integrity Summit* and the National Institute for Animal Agriculture’s *Antibiotic Symposium*. Steven also travelled with other Nuffield Scholars on a Global Focus Program, visiting the Philippines, China, Nova Scotia, Washington D.C., the Netherlands and Ireland.

In Steven’s report, he notes that in order to maintain a social license with the general public, the agricultural industry needs to continue to build trust with the public. Steven believes that the primary way of building and maintaining this trust is by being transparent. This can be achieved by increasing communication and general contact with the public, and by opening the industry to impartial third party audits (“Say what you do” and “do what you say”). Steven’s primary concern is that lack of industry action on issues that are important to the general public will lead to losing the public’s trust, which would in turn lead to regulations being imposed on the industry to which the industry would have little to no input or control over. With regards to animal welfare and antimicrobial use, these are complex issues with ever-changing expectations. This means that our responses to them need to be diverse and flexible. While certain targets or goals will need to be achieved to maintain public trust, the overall goal should be continual improvement. It is important to measure what we are doing and the corresponding outcomes – we will need to re-evaluate our goals and determine if what we are doing truly has a positive outcome.

## **DISCLAIMER**

This report has been prepared in good faith but is not intended to be a scientific study or an academic paper. It is a collection of my current thoughts and findings on discussions, research and visits undertaken during my Nuffield Farming Scholarship.

It illustrates my thought process and my quest for improvements to my knowledge base. It is not a manual with step-by-step instructions to implement procedures.

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# TABLE OF CONTENTS

## Contents

<b>SCHOLAR PROFILE .....</b>	<b>iii</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>iv</b>
<b>SPONSORSHIP .....</b>	<b>v</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>vi</b>
<b>DISCLAIMER.....</b>	<b>vii</b>
<b>TABLE OF CONTENTS .....</b>	<b>viii</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>2.0 WORKING TOWARDS “OUR COMMON FUTURE” IN ANIMAL AGRICULTURE.....</b>	<b>3</b>
2.1 The Sustainability Equation .....	3
2.1.i The Role of Social License in the Sustainability Equation .....	5
2.1.ii Trust = Transparency .....	5
2.2 Social License in Practice .....	6
2.2.i Animal Welfare Practices .....	7
2.2.ii Antimicrobial Use.....	10
<b>3.0 CONCLUSIONS .....</b>	<b>13</b>
3.1 Lessons Learned.....	13
3.1.i How do we Determine Success?.....	13
3.1.ii Beware of Unintended Consequences .....	14
3.1.iii Risks of Failing to Act.....	15
<b>4.0 RECOMMENDATIONS.....</b>	<b>15</b>
<b>5.0 GLOSSARY.....</b>	<b>17</b>
<b>6.0 REFERENCES.....</b>	<b>18</b>



## 1.0 INTRODUCTION

The raising of livestock in agriculture for meat consumption has continued to come under increased public scrutiny in recent years. The migration of people from farms and rural communities to cities has occurred at an accelerating pace in the past fifty years. This phenomenon has occurred across the globe at varying rates regionally, with the fastest changes occurring presently in the developing countries within Asia and Africa. In Europe and the Americas, the rate of change is slower, but urban populations account for, on average, eighty percent of the total populations in those areas.

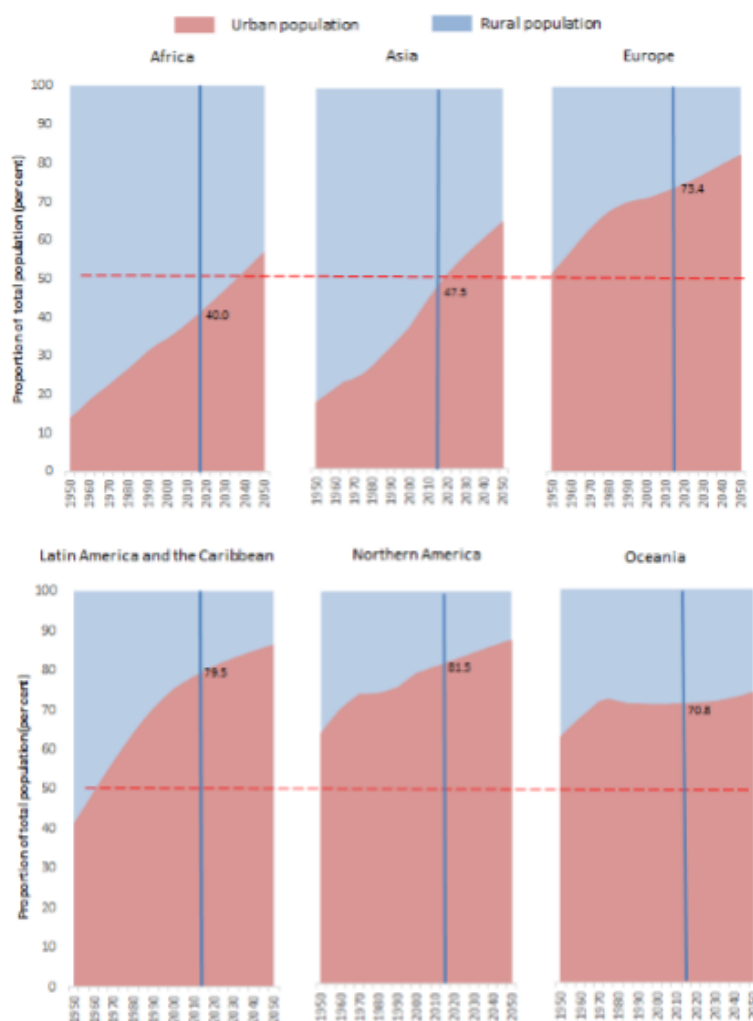


Figure 1. Urban and Rural population as a proportion of total population, by major area, 1950-2050 (United Nations, Department of Economic and Social Affairs, Population Division 2015)

But the story does not end there. Within that twenty percent which is the rural population, only a small proportion of those are actively involved in agriculture. Fewer than 700,000 people out of a rural population of just over six million were reported in the 2006 Canadian

census as being part of the farm population (Statistics Canada 2008). So even within the context of rural Canada, farmers are a small minority of the population. With the farm population being only 2.2 percent of the overall population in Canada, it is increasingly unlikely that a non-farmer has a personal connection to someone who is involved in agriculture. Overall, this has resulted in the vast majority of society having little physical connection to how their food is produced.

At the same time, the rise of the internet, and more recently social media, has resulted in the average person having access to an abundance of information. The sheer volume of information is at times overwhelming, and the contents of it are often unverified and/or contradictory. As result of this, consumers, armed with varying levels of information and understanding, are starting to ask more questions about how their food is raised. This is not unique to agriculture. Whether it is concerns about privacy on the internet, environmental concerns in manufacturing and in extraction of natural resources, or concerns with how farm animals are raised, consumer expectations are increasing. Those companies or industries that respond to and engage with consumers are more likely to succeed in this “Age of the Consumer”.

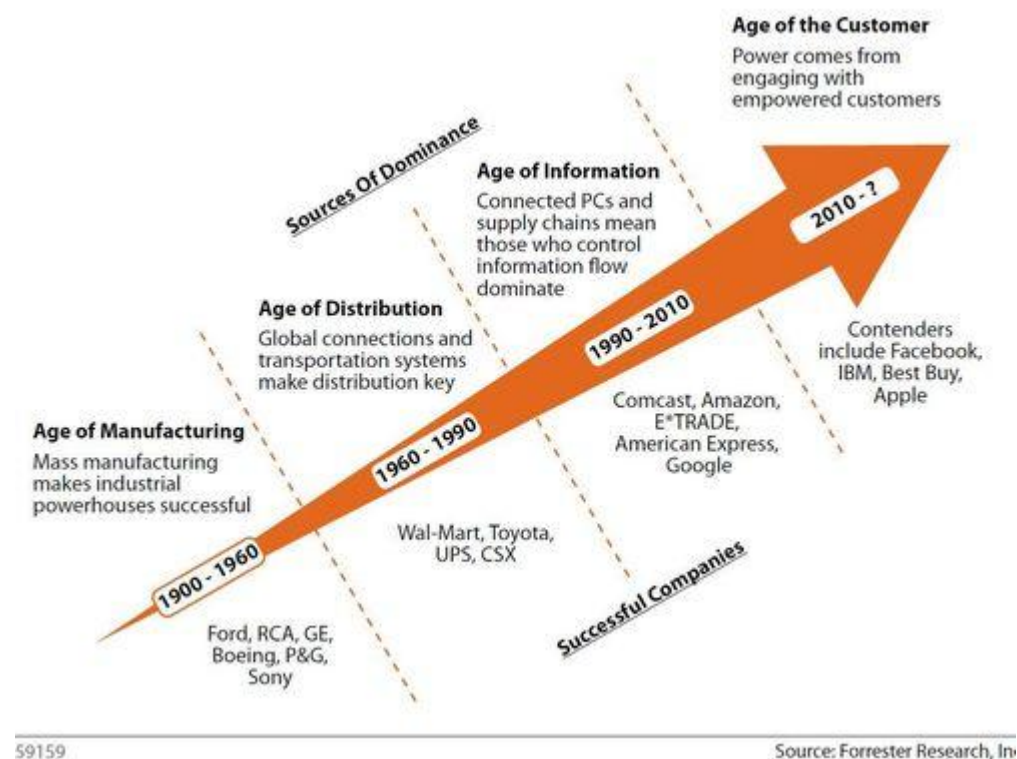


Figure 2. Changes in Influence of Consumers over time (Cooperstein, et al. 2013)

Because of changes in public awareness and acceptability (or lack of acceptability) of some farm management practices, the food animal industry is coming under an increasing number of

demands or requests for change from consumers and from retailers. These include, but are not limited to changes in animal housing and welfare standards, and questioning the use of antimicrobials in livestock production.

The disparity between expectations of the public and their perception of the realities on the farm needs to be addressed before we reach a breaking point.

## **2.0 WORKING TOWARDS “OUR COMMON FUTURE” IN ANIMAL AGRICULTURE**

### ***2.1 The Sustainability Equation***

The term “sustainability” has become a buzz-word in recent years. Socially conscious consumers are looking to purchase products that are produced sustainably, even though there is no clear definition of what sustainability means in the context of the agri-food industry (Agriculture and Agri-Food Canada 2012).

The term sustainability was used in the UN World Commission on Environment and Development’s (also commonly referred to as the Brundtland Commission) 1987 Report titled “Our Common Future”. In the report, sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations World Commission on Environment and Development 1987).

In that definition, sustainability refers to environmental or ecological soundness, and in the majority of consumers’ opinions, the environment is what they think of when they think of sustainability. In Nielsen’s 2011 Global Survey of Corporate Citizenship, two thirds of socially conscious consumers believed that the companies that they support should ensure environmental sustainability (The Nielsen Company 2012). While there is no clear definition of what sustainability encompasses, the most common assertion is that sustainability occurs at the intersection, or balancing of environmental, economic and social (or ethical) needs. As Richard Levins (1996) put it:

“...farmers in sustainable agriculture are concerned about feeding their families and paying their bills, but those are not their only goals in life. They set out to protect the land, improve their quality of life, and enhance the communities in which they live. Their day-to-day decisions are not guided by a single minded search for profit, but by a delicate balancing act among many goals.”

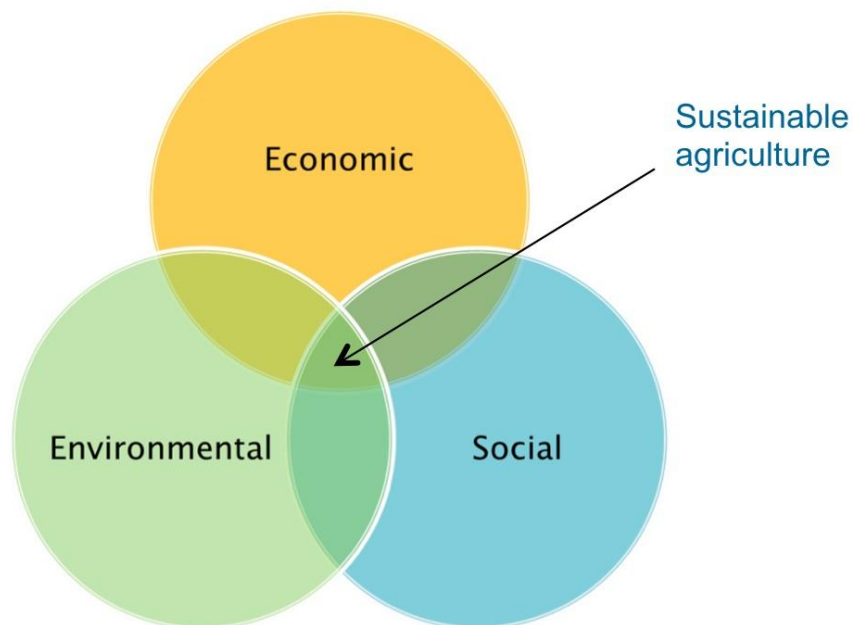


Figure 3. Venn diagram of Sustainable Agriculture (Fre-Energy Ltd. n.d.)

Public concerns revolving around environment have been raised for many years, going back to the middle of the past century in Rachel Carson's (1962) exposé of the use of synthetic pesticides in *Silent Spring*. In agriculture, while not perfect, many strides have been made in improving its environmental impact; in Ontario this includes the Ontario Pesticide Education Program and the development of Environmental Farm Plans.

Economic sustainability from the perspective of the farmer is achieved by economic viability of the farm, and the ability to earn a decent wage for the work that is done; it is the foundation upon which all other needs must balance. From the viewpoint of the consumer, economic sustainability also means availability of affordable food. Availability of affordable food may be something that is taken for granted in much of western society, but food price increases have been under public scrutiny as of late (CTV Montreal 2015) .

Social aspects of sustainability are broad-reaching, and include human (both farm workers and consumers) health and safety, and animal health and welfare. The science of environmental effects and the mathematics of economic soundness are relatively easy to measure, and can be evaluated based on knowledge of current facts. Social and ethical issues, however, are much more difficult to quantify, as they are based in large part on personal feelings and beliefs. This puts the agricultural community in quandary, which strives to make "science-informed recommendations" (Canadian Cattlemen's Association 2013). While it is quite reasonable to use scientific knowledge as the basis for decision-making in agriculture, it may not be the most effective way to portray to the public that we are handling social and ethical issues in a way that is satisfactory to them.

### 2.1.i The Role of Social License in the Sustainability Equation

The Center for Food Integrity, a not-for-profit food-system advocacy group in the United States, conducted and published consumer trust research, and presented its findings at their *Food Integrity Summit* in the fall of 2013. In their research, they found that having shared values were three to five times more important in building consumer trust than demonstrating competence (Sapp, et al. 2009). The reason this is important is that consumer trust is vital to grant social license. Social license is essentially the freedom to operate without any additional oversight or regulatory control because the public trusts that you are doing the right things.

Social License, in essence, is self-governed social sustainability. If public trust doesn't exist, or is lost, then the public will look for an alternative method to make sure that their concerns are addressed; by pressuring food processors (Smithfield Foods, Inc. 2007), retailers and restaurants (Clima 2012), or government (Edge, Davidson and Pearson 2007). If trust is so important in earning social license, then how do we go about building trust?

### 2.1.ii Trust = Transparency

The main way to build trust, and show that you have similar values to the public is by being transparent. The ability to be transparent, even in the midst of adverse events, such as during Maple Leaf Food's listeriosis outbreak in 2008, has long term benefits of maintaining public trust (The Center for Food Integrity 2015). At the *Food Integrity Summit*, Charlie Arnot, Chief Executive Officer of the Center for Food Integrity, overviewed seven essential elements of transparency that are necessary to build trust, and can be applied at the level of an individual farm or business, all the way up to industry associations.

- Motivation - The motivations for being transparent need to be genuine; it needs to be more than just a marketing or public relations ploy. The reason to become more transparent should arise from the desire to do the right thing and to respond to the

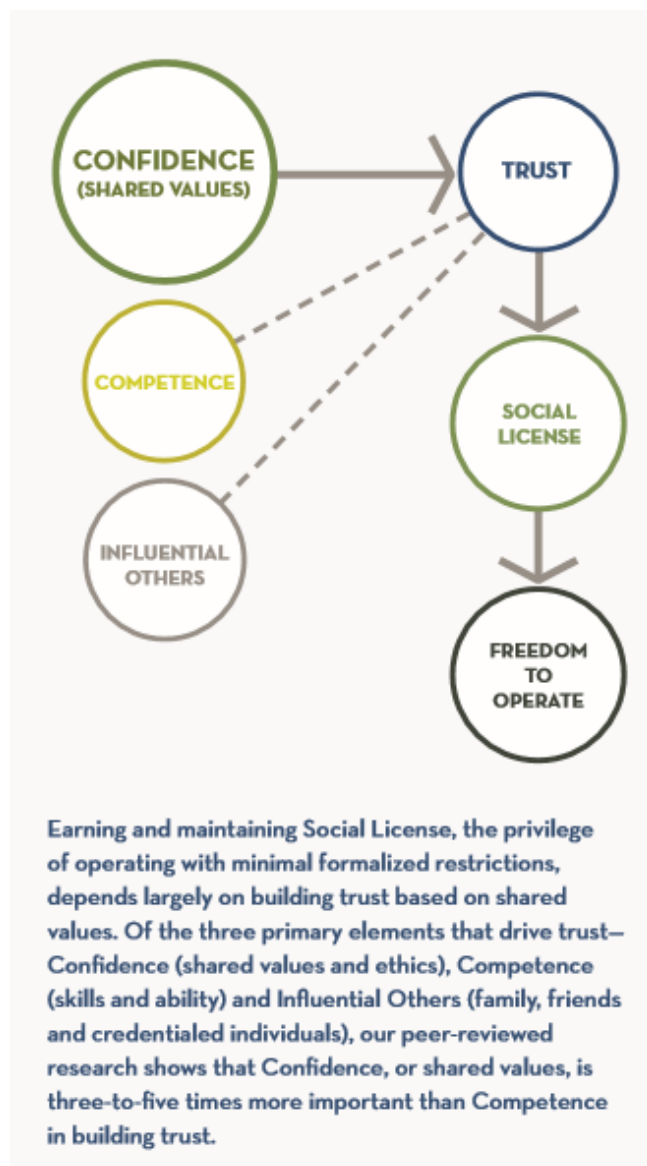


Figure 4. The Centre for Food Integrity's Consumer Trust Model (The Center for Food Integrity 2015)

needs of stakeholders – these would include consumers, retailers and other members of the supply chain.

- Disclosure – In order to be truly transparent, all legally releasable information is shared publicly. This includes both positive and negative information, not just the parts that make you look good.
  - Stakeholder Participation –Willingly engage those who are interested in the activities and the outcomes of the business. Develop a way for the stakeholders to give input, and acknowledge that input. Be willing to explain how and why decisions are made.
  - Relevance – Providing relevant information may appear to contradict disclosing all information, as “relevance” would suggest some degree of discretion or decision-making in what is released. Realistically, there needs to be some paring down of information to the relevant issues, otherwise stakeholders would be bogged down with too much information to make it useful. Relevance can be determined based on feedback received from the stakeholder engagement. This is why it is important for the stakeholders to have the ability to provide input. Likewise, it is important to focus efforts on stakeholder groups that have the most influence or control of social license.
  - Clarity – Information that is released needs to be made available in a form and manner that is easily accessible and understood. Clarity is judged by how well the information is understood by the target audience, not by what is intended by the sender.
  - Credibility – When both positive and negative information is shared, it lends an air of credibility or integrity to the process. It also opens up an opportunity for dialogue with the stakeholders about what went wrong, and what is being done to rectify the situation. This is useful when being accountable for mistakes, and when acknowledging that the “old way” of doing things is no longer acceptable.
  - Accuracy – Share information that is truthful, objective, reliable and complete.
- (The Center for Food Integrity 2015)

Within animal agriculture, in the absence of transparency, at best we lose control of the message and the way ethical issues are discussed. At worst, it gives us the appearance of knowingly hiding something we are ashamed of, and constantly puts on the defensive when dealing with problems. As noted by reporter Tom Kennedy in the 2012 *W5* reporting of undercover animal abuse footage provided by the animal activist group Mercy for Animals Canada:

“The image of production lines of animals being bred, raised and killed to provide low-cost meat, cannot be made pretty. It’s why the doors of the Canada’s pig farms have been kept firmly closed. Until now.” (Kennedy 2012)

## ***2.2 Social License in Practice***

In my Nuffield travels I looked at two ethical issues that are at the forefront in North America at the present; animal welfare and antimicrobial use. In examining how each of these issues has been managed in the countries that I visited, there are some patterns that appear. One is the difference between a proactive approach and a reactive approach; a proactive approach would be the best way to maintain social license. A reactive approach can still maintain and even build public trust and social license if the industry reacts in a way that shows that they share the



same values and concerns as the public. If the industry does react to the satisfaction of the public, then the public looks elsewhere for resolution through government legislation or industry regulations.

### 2.2.i Animal Welfare Practices

In Europe, many of the animal welfare standards for swine are based on minimum standards of welfare dictated by legislation from the Council of the European Union. Within the legislation, there is a provision for individual member countries to develop and implement stricter measures. The primary focus of the legislation is on animal housing and their environment, but there are also provisions for weaning age, castration and tail docking (The Council of the European Union 2008).

As per regulations across all of the European Union, all pregnant sows are kept in group housing for at least part of their pregnancy. Sows are permitted be housed individually while they are bred and for the first four weeks after breeding. This part of the legislation was phased in over a ten year period, but came into full effect January 1, 2013. In the legislation, it notes that one of the reasons for developing legislation across the entire Union was to establish common minimum standards so as to avoid competitive disadvantages in marketing pigs and pork within the Union (The Council of the European Union 2008). The United Kingdom banned the use of gestation stalls in 1999, and the banning of gestation stalls is often cited as the cause of increased cost of production and the cause of decreased pork production in the country (HumaneWatch 2013).



Figure 5. Some of the many on-farm adaptations implemented for loose sow housing in Europe. At a farm in Denmark (left), sows in small groups had access to self-locking stalls (where they were fed) that they could enter and exit at their leisure, with an exercise area behind the stalls. At a farm in the Netherlands (right) sows were housed in large groups in open straw-bedded pens with Electronic Sow Feeders that dispensed customized amounts of feed to individual sows identified by radio-frequency ear tags. (Photos by Steven Wolfram)

There are some differences from country to country. In Denmark, if there are individual sows that are thin or not doing well within their group situation, they can, under written veterinary recommendation, be locked in individual stalls for a short period of time (3 or 4 weeks) to

recover body condition, but must then be returned to their group pen or moved to an individual pen where they can move freely. In the United Kingdom, on the other hand, there is a complete ban of gestation stalls; sows and gilts must be housed in groups during their pregnancy. If a sick, injured, or non-competing bred sow needs individual housing, it must be in a pen where the animal can stand up, lie down, and turn around without difficulty (Department for Environment Food and Rural Affairs 2011).

Throughout Europe, farrowing crates are still permitted to be used to house sows when they are due to give birth, and while they are nursing their offspring. The move away from gestation stalls was to improve the sows' welfare by allowing freer movement and socialization of the animals. In the case of farrowing crates, the sows' welfare needs and the piglets' welfare needs both have to be taken into consideration. Restricting the sows' movements prevent piglets from being crushed to death inadvertently by the sows. Even though farrowing crates are still permitted, several farms are experimenting with different types of loose housing farrowing pens. One of the operations that I visited in Northern Ireland was conducting farrowing pen trials on their research farm in conjunction with a supermarket chain, while other farms were working on their own. Their reasons for exploring loose housing farrowing pens were for increased sow welfare, potential marketing opportunities, and attempting to understand and anticipate future consumer demands.



Figure 6. Traditional confinement farrowing crate (left), and alternative loose housing farrowing pen (right). (Photos by Steven Wolfgram)

Castration and tail docking are still permitted under European Union regulations, but they do have some restrictions. Tail docking is not allowed on a routine basis, only in cases where there is a history of tail biting occurring, and only after management is reviewed to make sure risk factors (overcrowding, poor ventilation, limited access to feed and water, dietary insufficiency) associated with tail biting are mitigated. While castration and tail docking are allowed, if the procedures are to be done on animals that are greater than seven days old, they are only



permitted to be performed by a veterinarian with appropriate administration of anaesthesia and pain control medication (The Council of the European Union 2008).

In addition to these government regulations, industry has stepped forward to implement additional measures. In this case, in 2010 the government (European Commission) acted as a facilitator getting the various members of associated industries (farmer organizations, retailers, scientists, processors, welfare groups and veterinarians) together to discuss the issue of castration. The plan that they came up with is voluntary, but most of the significant pig-rearing regions of Europe have signed on to this agreement. The initial phase (as of January 1, 2012) was to eliminate any surgical castration done without anaesthesia, with the end goal of discontinuing all surgical castration by January 1, 2018 (European Commission 2016).

Within the European Union, the individual governments are responsible for enforcement of animal welfare regulations, but most of the countries have some form of quality assurance program. Common elements among these quality assurance programs are that they are led and developed by industry associations, they have multiple areas of focus (which may include welfare, food safety, antimicrobial use, biosecurity, traceability), they have goals of continual improvement, and they have a third-party auditing system. A third-party audit is an evaluation performed by auditors with no direct association to the farmer or the quality assurance program. From the perspective of transparency and social license, an impartial third-party auditor lends an air of credibility to the process.

While each of the quality assurance programs is slightly different, there are a few areas to make special note of:

- There is a significant amount of movement of pigs and pork products across national borders. In countries which export live pigs, there is a noticeable effort to have their quality assurance programs align with the programs of other countries. For example, the Danish Product Standard (DPS) meet the requirements of the German “QS” quality assurance program, and a subset of Danish farms in DPS also produces to standards required by retailers in the United Kingdom.
- One of the programs in the Netherlands, *Beter Leven* (“Better Life”) awards one, two or three stars to producers who achieve increasingly stricter levels of animal welfare. This provides consumers with more information and choice, rather than not knowing anything more than the farm has met the minimal standards for the program. There is also a financial incentive for farmers to achieve the higher levels of certification, as their products can be sold at a premium.
- There does appear to be potential for consumer confusion in some countries where there are many different certification labels which may appear on products in the stores; not just for welfare quality assurance programs, but also . On the other hand, that could be seen as an opportunity for branding, engaging with the consumers to explain program differences, and develop brand loyalty.
- The Red Tractor Assurance program in the United Kingdom was quite unique. Arising from consumer confusion over multiple assurance programs, Red Tractor (then the “British Farm Standard” program) is a single quality assurance program coordinating

farm and food industry standards for pigs, dairy, poultry, beef and lamb, as well as for fresh produce and some other field crops. The program has expanded over time to be used in supermarkets, restaurants, and in some processed foods. By incorporating the Union Jack (or other nationalities' flags) in the logo, they are also able to show country of origin for the products, and assure that products coming from outside the United Kingdom have met their standards.

- Outcome-based welfare assessment is being looked at as a way to more accurately measure the true well-being of animals in production settings. The most common assessment tools in use now (including in the Canadian Pork Council's "Animal Care Assessment") tend to use "resource-based" evaluations. Resource-based evaluations are in general, factors that are easy to measure; stocking density, access to feed and water, air quality, light levels, etc. Outcome-based evaluations look at the health and welfare of the animals themselves. The Red Tractor Assurance program has recently launched their outcome-based assessment, which they have titled "Real Welfare". This assessment will look at factors such as lameness, tail lesions and skin lesions associated with fighting.

## **2.2.ii Antimicrobial Use**

The use of antimicrobials in animal feed as growth promoters have been banned across Europe since 2006. Although this ban is now enforced across the European Union, the removal of antimicrobial growth promoters initially began as an industry-led, voluntary change in some of the member countries (United States Government Accountability Office 2011). In spite of the unified front on the banning of antimicrobial growth promoters, there are no uniform standards for measuring antimicrobial use (AMU), and no uniform agreement on what levels of antimicrobial use are acceptable. Over time, several European countries, including Denmark, Belgium, the Netherlands, and Germany, have developed their own algorithms for quantifying AMU on farm. Some of the national programs are more mature, while others are in the early stages of use. These countries are now in the process of trying to agree upon a standard process of measuring AMU, so that there is a way to effectively share and communicate findings between scientists and between their governments.

In Denmark, veterinarians are no longer permitted to sell medications; part of the government regulation restricting the sales also requires that the veterinarians visit the farm on a monthly basis. Those monthly visits involve a review of the herd health and management, observation of the animals, and possible disease investigations or diagnostics. The other part of the visit, however, is a review and placing the order through a pharmacy for the medicines needed over the next month. Those sales figures are also automatically forwarded to VETSTAT, a government-funded antimicrobial use monitoring system. An Average Daily Dose (ADD) for the farm is calculated on a monthly basis, based on the pharmaceutical sales information and the number and type of animals on farm. Penalties are given if the rolling nine month average ADD crosses a certain threshold (different levels are set for sows, nursery pigs and finishers). The nine month average does allow for a short period of higher levels of antimicrobial use when needed for a disease outbreak, but the penalties for exceeding the ADD limit are significant – a 5500 Danish Krone fine (approximately \$1200CAN) and an increased risk of inspections by

regulators to see that plans to reduce antimicrobial use are made and followed through. Because feed medications can dramatically raise a farm's ADD, feed medications are used sparingly if needed (i.e. only a few days duration in either the nursery or finisher), and are usually added to the feeds on farm rather than through the commercial feed mills.

The AMU data from VETSTAT is forwarded to the Danish Integrated Antimicrobial Resistance Monitoring and Research Program (DANMAP), which also collects AMU information from human medicine, as well as antimicrobial resistance (AMR) data from bacterial isolates from human medical cases, veterinary submissions, and food samples. DANMAP analyses this data to determine if trends change over time in either AMU or AMR, and to see if there are any links or associations between the two. This information has been used to inform decision making on voluntary bans and/or changes to what antimicrobials are used on farm (National Food Institute, Statens Serum Institut 2013).



Figure 7. Veterinarian Dorte Risum and Danish swine farmer reviewing production records and antimicrobial purchases. (Photo by Steven Wolfram)

The German model for measuring and reducing AMU is, in contrast, in its infancy. Germany's AMU reduction program had just been unveiled in the spring of 2014 when I met with German veterinarian Alexander Bernick. He was concerned that this new legislation and control program would prove to be a logistic challenge; according to the new legislation, antimicrobials were now to be dispensed for a maximum of seven days (Federal Ministry of Health 2014). There were literally not enough hours in the day for Dr. Bernick to visit all of his clients once every seven days; as most of his client farms (especially ones with larger herds) used some form of antimicrobial every week, a once-weekly visit would have been necessary to fulfil the requirements of the legislation. Other aspects of the program appeared to create a regulatory burden for the veterinarians and the farmers:

- Veterinarians were required to write out prescriptions for all medications; the prescriptions needed to include treatment instructions, reason for use, the animal's identification, weight and dose. The farmer would then have to write down the daily treatments given on that same sheet.
- Those treatment records are then used every six months to calculate the farms "half-yearly treatment frequency" (a method, slightly different than the Danish "Average Daily Dose" model, of calculating antimicrobial use on a per animal basis). The farmer would then be required to compare his/her half-yearly treatment frequency to published averages of other farms from across the country.
- The highest fifty percent of farms are required to consult with their veterinarian, determine why treatments are occurring at a higher frequency, and how he/she can reduce AMU.
- The highest twenty-five percent of farms are required to develop, in consultation with their veterinarian, a written plan for AMU reduction. This plan also must be submitted to a government authority. If a farm fails to develop and implement their written plan, and repeatedly appears in the highest twenty-five percent of farms for treatment frequency, then penalties can include up to a three year ban from owning livestock.

In the Netherlands, their AMU control program is a more co-operative approach between government and industry. Agricultural AMU came under increased scrutiny by the public and by government in the second half of the last decade. AMU in animals increased over that period, while use in humans was declining. There were also an increasing number of cases of Methicillin-resistant *Staphylococcus aureus* (MRSA) in humans. At that time the national government approached the agricultural industry and veterinarians, and implored the industry to take action, or else the government would need to intervene with legislation. The Netherlands Veterinary Medicines Authority (NVMA) was formed, with funding from both government and industry, to promote responsible use of antimicrobials on farm. One of the nice aspects of this program is that it benchmarks farms use levels (against other farms), but it also benchmarks the dispensing levels of veterinarians (against other veterinarians). In 2010, the death of a Dutch woman from a multiple-resistance bacterial infection (Extended Spectrum beta-lactamase Enterobacteria) resulted in extra light being shed on the issue, and caused the government to step in and set goals for reducing AMU in agriculture (Van Beers 2014). The first goal (twenty percent reduction in AMU compared to 2009 levels) was reached in 2011, and the second goal (fifty percent reduction in AMU compared to 2009 levels) was reached in 2012. A new goal of a seventy percent reduction in AMU compared to 2009 levels has been set. I have not been able to find any explanation for how the levels for those goals were established, or if there is any end goal (i.e. an eventual "acceptable" level of AMU) in place. In order to achieve continued downward pressure, benchmarking (using Animal Defined Daily Dosages per Year – ADDD/Y, another slightly different way of calculating usage) has a Target level, as well as higher levels that dictate further investigation or actions to reduce use.

In North America, AMU is increasingly at the forefront of the public's and government's attention. Some retailers and restaurants, such as McDonald's (McDonald's USA 2015) and

Subway (Subway 2015), have recently capitalized on this issue and have come out with pledges to source ingredients from animals raised without antibiotics. Pharmaceutical companies are in the midst of a voluntary phase-out of growth promotant levels of antimicrobials that are also used in human medicine. AMU data in the United States and Canada is currently in summary form only, with sales data voluntarily provided by pharmaceutical companies. The exploration of farm-level AMU data collection in the United States is controversial (Snelson 2014). There is a need for more action on this issue, and an opportunity for industry to continue to work with government; how the industry responds will dictate what kind of input industry is allowed to give going forward.

## **3.0 CONCLUSIONS**

### ***3.1 Lessons Learned***

The animal agriculture industry is at a crossroads. We have an opportunity to engage with our consumers, find out what they are worried about, correct any potential misconceptions, and work towards resolving their legitimate concerns. Because ethical issues are complex issues to deal with, and because the desires of members of the public are not uniform, the response will need to be both flexible and diverse. If industry fails to respond to issues in a manner that is satisfactory to the public, then it could potentially lose control over the response.

Consumer expectations and scientific knowledge both change over time; as such the industry's response needs flexibility built into it. While certain minimum standards must be met across the industry to achieve consumer confidence, there is opportunity for differentiation of products based on increased standards.

#### **3.1.i How do we Determine Success?**

There are two management sayings often attributed to management consultant Peter Drucker: "You can only manage what you can measure", and "What's measured, improves" (Lehmann 2012). In order to determine if we are successful in implementing changes, we need to have a good understanding of what our outcomes or goals are, and how to measure them.

This is especially true in the area of antimicrobial use. The ultimate goal may be to reduce antimicrobial resistance in human illnesses, but it is difficult to measure or quantify the impact of AMU in animals on AMR in human illnesses (McEwen, et al. 2002); many other factors can come into play in determining that outcome. Measuring antimicrobial use in animals is something that can realistically be achieved, and should be the focus in animal agriculture (National Institute for Animal Agriculture 2014). AMU in individual animals may be the most useful way to predict the potential impact of use on the development of AMR; but farm-level antimicrobial sales may be the most practical way to collect usage data. Farm-level antimicrobial sales data are the basis of per-animal usage numbers in the different European AMU programs that I observed on my studies. Antimicrobial resistance in animal bacterial populations also needs to be measured; changes in AMR can be used to determine if restrictions or changes in antimicrobial use are warranted.



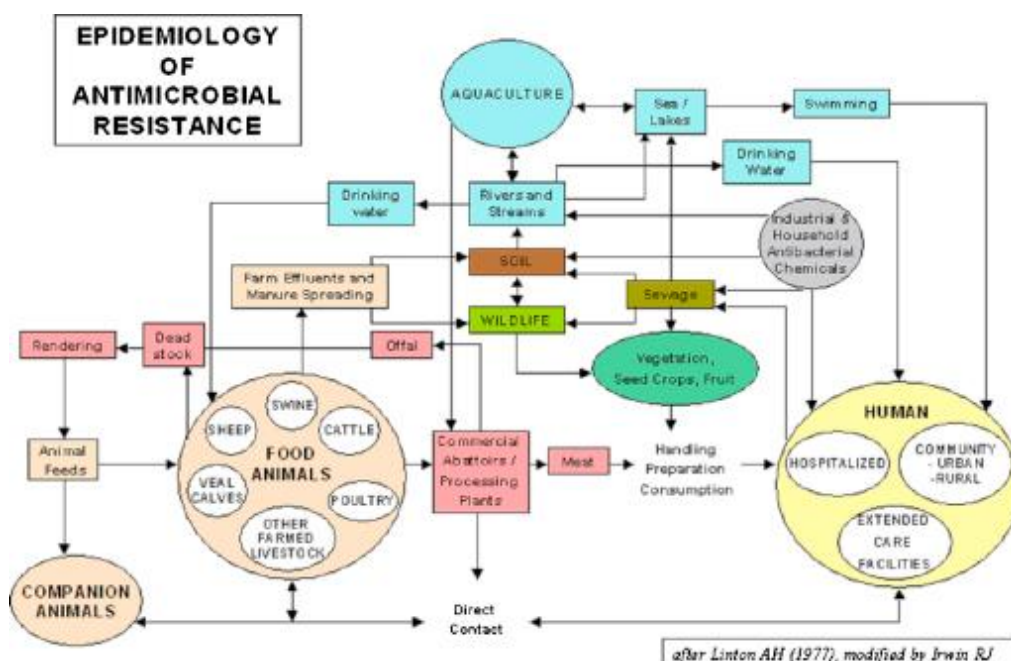


Figure 8. Pathways for Transmission of Antimicrobial Resistance in Human and Animal Populations (Public Health Agency of Canada 2007).

For the issue of Animal Welfare, the outcome that we should measure is the actual welfare of the animals. While minimum standards may be needed for factors such as housing, outcome-based assessments (for example, the Red Tractor Assurance program's "Real Welfare") will best achieve overall improvement in animal welfare. Measuring body condition, lameness, lesion scoring, stockmanship (staff training), and percentage of morbidity and mortality will give a true indication of the animals' welfare. Assessment tools, such as those used within international quality assurance and management systems (e.g. ISO 9001), will allow and promote continuous improvement on the farm (Main, et al. 2014).

### 3.1.ii Beware of Unintended Consequences

It is not, however, as easy as setting some goals and meeting them. Every action that we take may lead to some desired outcome, but we must also beware of unintended consequences. Steps taken to reduce antimicrobial use and resistance could potentially have negative impacts on the environment, food safety, or animal welfare. In some instances, reducing antimicrobial use could actually increase antimicrobial resistance. Researchers at the University of Guelph found that when weaned pigs were fed high (therapeutic) levels of zinc oxide, the pigs were more likely to become carriers of MRSA (Slifierz, Friendship and Weese 2015). Therapeutic levels of zinc oxide are used in weaned pig diets as an alternative to antibiotics for controlling post-weaning *E. coli* diarrhea. In MRSA, a gene that controls zinc resistance (*czrC*) is located close to the Methicillin resistance gene (*mecA*) (Slifierz, Friendship and Weese 2015). Thus, in the presence of therapeutic levels of zinc oxide, zinc resistance is unintentionally selected in *Staphylococcus aureus*, while the Methicillin resistance in *Staphylococcus aureus* is inadvertently co-selected at the same time.

Similarly, changes in animal care and housing may have either positive or negative effects on the environment, food safety, antimicrobial resistance or animal welfare. We cannot look at these issues in isolation, but need to take a system-wide (i.e. animals, people and the environment) approach to assessing interventions and their impacts. An overall net benefit to the system is needed to justify adopting changes.

### **3.1.iii Risks of Failing to Act**

When industries fail to respond to issues in a manner that was satisfactory to the public, public trust (and thus social license) is lost, and the industry then loses control over the response. In the case of government legislation, rules may be imposed on industry, which are not necessarily based on science or reasonable outcomes. Individualized animal welfare standards and/or antimicrobial use policies have also been implemented by meat processors and retailers/restaurants, with varying levels of input from the agricultural community. This can result in a fragmented response within the industry and confusion for consumers with respect to what each of the different standards and policies mean. There is also potential to lose market share, either domestic or export, if current practices do not keep up with changes in consumer expectations.

## **4.0 RECOMMENDATIONS**

Building and maintaining consumer trust is the key factor in preserving our social license in animal agriculture. Because of this, industry needs to take the lead in responding to social and ethical concerns, and needs to be transparent in its response.

- In practical terms, this means implementing independent third-party auditing of our quality assurance and welfare programs. Minimum standards and areas for improvements need to be clearly stated, easily measured, and should be based on input from stakeholders, current scientific knowledge, and desired outcomes.
- Our industry needs to commit to reporting antimicrobial use at the farm level. This will require a co-ordinated program with the participation of farmers, veterinarians, feed mills and over-the-counter livestock medicine retailers. At this point in time, I think it is most useful to promote a culture of continual improvement in antimicrobial use on farm, rather than set arbitrary limits on antimicrobial use. Improvements in vaccine use and development, management, nutrition, housing, genetics, antimicrobial alternatives can help reduce the usage of antimicrobials without significantly affecting the well-being of the animals. Surveillance testing for antimicrobial resistance in animal bacterial populations will let us know if our methods of controlling antimicrobial use are being effective, and can inform future decision making about AMU restrictions.
- Communication between industry and the general public needs to be fostered. There needs to be a two-way flow of information; we need to listen to consumers and respond to their concerns. It's not good enough anymore to just tell the public what we are doing and why we are doing it. We can educate consumers, but we shouldn't hide behind the banners of "It's legal" or "It's standard in the industry" when dealing with

controversial issues. Showing our concern for the animals' and the consumers' well being will go a long way towards building trust. Admitting our shortcomings in issues where the industry is lagging behind, such as in pain control for surgical procedures, will give us credibility with the public, rather than open us up for attack.

- Because these ethical issues are complex, our research priorities need to be multifaceted. Basic research is needed in areas such as antimicrobial resistance development and transmission. Applied research is needed in the areas of genomics, vaccine development and validating the usefulness of alternatives to antimicrobials. Consumer research on an ongoing basis will give us insight into changes in consumer expectations as they happen, allowing for a quicker and more effective response by industry.
- We need to encourage increased collaboration within our livestock sectors, and across the animal agriculture industry. Dealing with these complex issues will require co-ordinated response if it is to be successful.



## 5.0 GLOSSARY

**Antimicrobial** An antimicrobial is any agent that kills or inhibits the growth of a microorganism. This includes disinfectants, antiseptics, and any agents that will kill or inhibit the growth of bacteria, viruses, fungi or parasites. For the purposes of this paper, and in common use, antimicrobial use (AMU) and antimicrobial resistance (AMR) refer specifically to agents that act against bacteria; these agents are also commonly referred to as antibiotics.

**Castration** The surgical removal of testicles. Male pigs are castrated to prevent unwanted behaviour of intact males and to prevent the occurrence of “boar taint” (unpleasant taste/smell of meat).

**Farrowing rate** The percentage of mated sows and/or gilts that carry their litter to full term and give birth (farrow).

**Farrowing crate** Individual close-confinement stalls used to house sows at the time of giving birth (farrowing) and while they nurse their offspring. Farrowing crates have a separate, but attached creep area that the piglets can access but the sows cannot. These crates lessen the risk of sows injuring or killing their piglets by inadvertently kicking, stepping on or lying on the piglets. At the same time, it restricts the sows’ natural movements; she can stand up and lie down, but cannot turn around or walk.

**Gestation stall** Alternatively called gestation crates or individual maternity pens, gestation stalls are individual enclosures used to house pregnant sows and gilts. These crates protect the sows from fighting with other aggressive sows. At the same time, it restricts the sows’ natural movements; she can stand up and lie down, but cannot turn around or walk.

**Gilt** Young female pig; the term is used for any female pig up until the time of delivering her first litter of piglets.

**Socially Conscious Consumer** Those who expressed willingness to pay extra for products and services from companies that have implemented programs to give back to society (The Nielsen Company 2012).

**Sow** Adult female pig, which has given birth to at least one litter of piglets.

**Tail Docking** The intentional removal of a part of the tail. In pigs, tail docking is usually done to minimize tail biting behaviour in young pigs.

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