Soil Association response to allegations in Carter Ruck letter of 16 September 2010 re Foston Pig Farm

December 2010

Extracts from Carter Ruck's letter are followed by Soil Association response in red text.

Our client's obligations are to abide by the existing codes of practice. If you believe those codes to be weak or too flexible you should take the point up with those who determine the codes and not an individual company who has to work within them or a planning department that seeks to ensure compliance with them.

There are a number of rules and 'codes of practice' that apply to pig farming in the UK, starting with the general law, which is what a company 'has to work' within. The voluntary Assured Farm Standards 'Red Tractor' codes mainly ensure compliance with the law, through, for pigs, quarterly inspections. Then there are the RSPCA's 'Freedom Food' standards, and organic standards set by European law. A company can choose which codes if any they adopt. We and many other NGOs regularly urge companies to adopt higher standards. A planning department does not 'ensure compliance' with any of these codes or standards.

standards have achieved accreditation by UKAS to ISO65 EN45011. Soil Association Pig Standards are not approved by AFS and therefore must additionally have AFS or Genesis certification to allow the mainstream product to meet retailers' requirements.

Organic standards (including the Soil Association's) are based on EU law, and are substantially higher than AFS standards, so of course have no need to be 'approved' by AFS. None of the additional issues covered by AFS schemes required by multiple retailers who sell organic food relate to animal welfare.

The standard of all such benchmark auditing is ultimately an objective measure of subjective criteria. Your assertion that UK farm assurance guidelines are not a guarantee of high farm animal welfare is one of comment rather than fact and, given the authority and reputation of the Soil Association, there is clearly a responsibility on your part to make that clear.

All of our submission to the planning officer is clearly comment by the Soil Association, based on our understanding of the facts. Our comment on AFS related solely to animal welfare and our reason for drawing attention to the fact that AFS standards 'are not a guarantee of high animal welfare' is because Midland Pig Producers (MPP) has made a number of public claims about the welfare of the pigs on the proposed enterprise that might lead the public to misunderstand what standards of animal welfare are applied. Animal welfare is mentioned repeatedly in the planning statement prepared by Fisher German for MPP. In the 'Frequently asked questions' document submitted as part of the planning application, reference is made to Genesis Quality Assurance scheme in answer to the question 'What consideration has been given to animal welfare'. On its website Midland Pig Producers also states that 'MPP is part of the internationally recognised Genesis Quality Assurance scheme, which includes independent quarterly veterinary inspections to aid achievement of **the highest animal welfare conditions'** (our emphasis).

Carter Ruck says that 'The standard of such benchmarking is ultimately an objective measure of subjective criteria'. We are drawing the attention of the planners to this subjective aspect of Midland Pig Producers' statements on animal welfare, because to anyone who is not familiar with the detail of UK farm assurance guidelines in relation to animal welfare, these are potentially misleading. The RSPCA has its own 'Freedom Food' standards where the welfare standards are higher than AFS guidelines. Independent benchmarking of the various standards (unpublished) was undertaken by CIWF in 2007. This rated the schemes against a series of animal-welfare criteria. In relation to pig

production, the organic certification scheme run by the Soil Association was the only one to receive their highest (gold) rating. AFS schemes were characterised as the industry norm and rated below bronze. The additional welfare improvements included in the MPP's proposals, such as their award-winning farrowing crate are of course welcome, but in our view do not compensate for the fundamental animal-welfare weaknesses inherent in intensive indoor systems.

It is revealing to note that the research cited as the basis for your assertions is largely American where there is a very different farming culture without a nationwide, independently audited assurance scheme to maintain standards. Standards and legislation are higher in Britain than in the USA. For example, British legislation bans the use of stalls and tethers and British standards ban castration of boars. Manipulable material (usually straw) is also a requirement of the British standard. In addition, 40% of the UK's breeding herds are outdoors which makes the industry in this country totally different in both attitude and management and therefore standards.

We recognise that there are differences between typical production systems in different countries, but it is also the case that some features of intensive production systems are broadly similar throughout the world. While we recognise this means that not all research is relevant to all situations, it is internationally accepted that research published in a reputable peer-reviewed journal can be used to substantiate a scientific argument if it is relevant to the point or points being made. David Burch, whose work is cited in the letter from Carter Ruck, takes data from a paper by US scientists for his 2002 paper on the transmission of campylobacter, which Carter Ruck cites. In Fisher German's Planning Statement on behalf of Midland Pig Producers, US research is cited in relation to equipment they plan to use which is only available from the US.

J W Leavesley's initial letter makes the inappropriate claim that only research which the Soil Association had undertaken itself should be cited. Carter Ruck's letter back-tracks on this but refers to the fact that 40% of the UK's breeding herd is outdoors, to justify the claim that only British research is relevant to the proposed development at Foston. It seems to have escaped their notice that all of the sows and all of the pigs on the proposed unit at Foston will be kept indoors all of the time, so this fact is completely irrelevant. Also, since the scale of the proposed pig unit at Foston is significantly larger than any existing pig farms in the UK and many times larger than typical units, we found it necessary to look to countries like the US for evidence of the type of problems that may arise if this unit were to be granted planning permission.

More importantly, many of the issues which we raised relate to areas of concern where research is continuing in an attempt to establish and/or quantify likely risks which have previously been identified, but where no one country alone is undertaking sufficient research into all relevant dimensions of these issues to provide a complete answer on its own. Our reason for raising some issues where the evidence is currently not conclusive was to draw them to the attention of the planners as areas of possible concern given that their potential consequences are significant and as such we believe the precautionary principle should operate until sufficient research has been undertaken and a scientific consensus emerges. We did not see it as necessary or appropriate to go into the fine details of the scientific reasoning behind our concerns in our initial response to the planners' consultation exercise.

Your email dated 12 August 2010 states, '*The extremely high number of pigs housed in one location may increase the level of disease on the holding and over time that may pose a threat to the local community at the very least*' [Our emphasis]. We question what reliance should be placed on a statement that requires three qualifications and suggest that it is misleading and irresponsible to make such a statement without citing or acknowledging the following point made by Silbergeld, Graham and Price in the same 2008 Report that you refer to:

> *'For all these reasons, it may not be possible to determine the attributable risk of antimicrobial use specific to agriculture or to the use of specific antimicrobials as feed additives – in terms of overall incidence of resistant human infections, given a model that incorporates the notion of communities of humans and bacteria'.*

The clear inference to be drawn from your objection is that the volume of pigs is, in itself, a justification for concern. In isolation and without any other reasoning (which is conspicuous by its absence) that is an inadequate basis for your objection. You are no doubt familiar with Professor Sandra Edwards of the School of Agriculture, Food and Rural Development at the University of Newcastle who has stated, '*It is not the number of pigs, but the quality of bio security which determines level of disease*' and our client agrees.

It was clearly necessary for us to add the qualifications we did since, even where the science is well established, it is only possible to make reasonable assessments of what may happen in the future based on the available evidence and experience on other large farms. No one can state with certainty what will happen in future. In relation to the contribution of agriculture to the problem of antimicrobial resistance referred to in the quotation from the paper by Sibergeld et al., we are very familiar with the different aspects of this debate which is well represented in the scientific literature. We have long recognised that the point 'It may not be possible to determine the attributable risk of antimicrobial use specific to agriculture' is valid, because there are a large number of still unknown factors, this is a developing area of scientific research and both bacteria and antibiotic-resistance genes can and do sometimes mutate in subtle ways between the time they are present in animals and the time they are suspected of causing of infection in humans, making it often extremely difficult, if not sometimes currently impossible to prove their origin conclusively. In addition resistance genes can also, for example, be transferred between different bacteria, including between animal and human bacteria, making it difficult to determine with certainty the origin of any antimicrobial resistance.

It is relevant to note that when the European Union progressively banned the use of 11 antibiotics known as growth promoters in the feed of farm animals between April 1997 and January 2006, this was done in large part as a precautionary move, as there was then, and remains today, a level of scientific uncertainty and therefore dispute about the extent and relevance of the problems it was hoped this legislative change would address.

While assessments of the likely extent of the contribution of animal-derived resistance vary between scientists, few if any, will deny that food animals are contributing to this problem to a certain extent. The European Food Safety Authority has published a review of the science which shows that for certain bacteria, such as salmonella and campylobacter, most antibiotic resistance in human infections comes from farm-animal antibiotic use (EFSA 2008). Furthermore, over the last decade evidence has emerged to show that antimicrobial resistance transfer between both animals and humans, and humans and animals occurs more frequently and with far greater facility than was previously believed. In addition, using the most modern techniques, scientists are now just beginning to quantify these issues. A Dutch government scientist recently reported at a conference at Warwick University, for example, that they have calculated that 9% of the Extended-spectrum beta-lactamase resistant E. coli infections causing illness or death in their country originate from poultry. With this evidence in mind, it is important to note that a British survey of antibiotic use on 482 pig farms found that there was a statistically significant association between the use of

in-feed antimicrobials and the size of the farms: small farms were less likely to use them than either medium or large farms, and large farms were more likely to medicate individual weaners than either small or medium farms. The same survey found that pig farms that were certified by AFS schemes such as Assured British Pigs and Assured British Meat used significantly more antibiotics than those certified by Freedom Foods or the Scottish Pig Industry Initiative (Stevens et al. 2007).

Carter Ruck's letter of 16 September cites the opinion of one British scientist Professor Sandra Edwards, that levels of disease are not related to herd size. While Professor Edwards is not entirely alone in her view, and while we, of course, accept that good biosecurity can reduce the risk of disease arising; there is nevertheless a substantial amount of hard evidence that greater herd size is linked with higher levels of disease and as a result many scientists take a different view from Professor Edwards. Moreover, while some of these diseases are not a direct threat to humans, because they only affect pigs, there is an additional significant body of research showing that several of these diseases weaken pigs' immune systems and as a result also increase levels of secondary infection with diseases some of which do pose a threat to humans.

Moreover, in relation to Professor Edwards' point about biosecurity, while there are many important aspects to biosecurity, one aspect, the significant regular use of biocides to prevent or reduce infection - something which appears to be part of Midland Pig Producers' biosecurity on its existing pig farms - additionally contributes to the development of antimicrobial resistance strains of disease. At a recent conference at Warwick University organised by the British Society for Antimicrobial Chemotherapy (BSAC) in association with the Veterinary Laboratories Agency (VLA), Dr Mark Webber from the University of Birmingham told delegates, 'We have demonstrated that persistent exposure of Salmonella to various biocides can select mutants with decreased susceptibility to biocides and multiple antibiotics' (Webber 2010). While this is clearly an emerging issue for everyone who uses biocides on farms, in hospitals and even in the home, it is necessary to note that there is a downside to production systems that require high use of biocides as part of their biosecurity measures. Given the almost inevitable development of salmonella in the herd at some point, biocide use could increase the rate at which antimicrobial resistance in salmonella spreads and indeed may even help to explain why there is already major concern about the high level of multiple antibiotic resistance in salmonella from British pigs. At the same conference, Finn Twomey from the VLA and co-authors presented the results of a major study of 270 British pig herds where 28% of 15,790 samples tested positive for salmonella, 62% of which were multiply antibiotic-resistant (Twomey et al. 2010).

In relation to the link between herd size and levels of disease (whether antibiotic-resistant or not) an article about Porcine Reproductive and Respiratory Syndrome (PRRS) by the Canadian pig consultant Dr Camille Moore, DVM, states: 'The herd size is always important in disease dynamic. Everything is easier to achieve in a 300 sow herd than it is in a 3000 sow herd. In those large herds we have to deal with what we call subpopulation. This mean[s] that status variation could exist within the different sections of your herd.' (Moore 2004).

Other Canadian scientists state that PRRS 'Is one of the most economically important diseases affecting the swine industry worldwide'. In a study of herds with PRRS they found that: 'Larger herd size was associated with an increased risk of reporting abortion, weakborn piglets, off-feed sows, and sow mortality in sow herds, and with an increased risk of reporting mortality in finishing herds' (Young et al. 2010). Using a simulation, Dutch scientists found that "when PRRSV [PRRS virus] is not reintroduced from outside, the infection can `rapidly' become extinct in small sow herds, but it can persist for a very long time in large sow herds" (Noedlijk et al. 2000). British scientists subsequently confirmed that persistence of PRRS increases with herd size in a study of 103 pig herds (Evans et al 2008). Of the secondary bacterial infections associated with PRRS, at least three are zoonoses or potential zoonoses (salmonella, streptococcus suis and swine influenza), and therefore pose a risk to human health (see Elanco 2002).

Regarding herd size and other pig diseases:

- an article by A.W. Tucker, Lecturer in Veterinary Public Health and Pig Medicine, University of Cambridge, reports on a UK study carried out on 116 pig farms which found that a herd size of over 600 breeding sows was a risk factor for Porcine Multisystemic Wasting Syndrome (Tucker 2006).
- according to a NADIS BPEX commentary on post-weaning mortality in British pig herds, there is a 'fairly steady trend of increasing percentage loss with herd size' (NADIS BPEX 2010)
- The seroprevalence of Aujeszky disease virus in pigs increases with herd size (Maes et al. 2000)
- Several studies have found that salmonella incidence increases with herd size (see Garcia-Feliz et al. 2009, Hautekiet et al. 2008, Mejia et al. 2006, Carstensen and Christensen 1998, Osterberg et al. 2006). However, some have found the opposite (Baptista et al. 2009, van der Wolf et al. 2001). Nevertheless, given that most evidence suggests that large herd size leads to higher levels of salmonella, it is not surprising that UK Veterinary Laboratory Agency scientists appear to have concluded that small herd size may explain why some pig units do not have salmonella (see Wales et al. 2009)
- Italian scientists have found that genotype 3 hepatitis E, a known zoonosis, is significantly more prevalent in pig farms with over 1000 sows than on smaller farms. They commented that 'this latter finding is common for most swine infectious diseases' (Bartolo et al. 2008)
- Large herd size is suspected of contributing to the incidence of swine dysentery (Klein 2005, Portec 2010)

The fact that antimicrobial use is higher in large British pig herds (Stevens et al. 2007) is consistent with the fact that disease levels tend to be higher in large herds.

Your email goes on to speculate on the risk of airborne antibiotic resistance genes but without making any attempt to quantify that risk which we suggest is grossly irresponsible when making such serious claims. We should also point out that the American report on which you base your alarmist conjecture was based on samples taken from cars with windows down, air conditioning off and fans switched off driving behind poultry not pigs and on open crate transportation which our client does not use.

We recognise that the research we cited related to poultry not pigs and that because the poultry in the study were transported in crates, the levels of antibiotic resistance detected in a car travelling behind are likely to be higher than those that might be found with pigs, which would be travelling inside a lorry, albeit with good ventilation. Nevertheless, we felt it was worth drawing this issue to the attention of the planners since this is the first and, as far as we are aware, only research on this issue and the researchers conclude that further research is needed. In addition, in some cases the actual level of antibiotic-resistant bacteria transferring in this way may be less significant than whether such transfer is taking place at all. As such it is clearly impossible for anyone to quantify the risks at this stage.

It should, though, be noted that there is a large body of research showing that antibiotic-resistant bacteria are commonly found in large numbers in the air inside buildings housing pigs, despite the use of adequate ventilation systems. It is likely that similar levels will also arise inside lorries transporting pigs. Since these have to have ventilation air will continually be passing into the lorry over and amongst the pigs and then back out again, which could in theory lead to the passage of antibiotic resistance to vehicles and people in them, in a similar way to that observed by the researchers from John Hopkins University in the US (Rule et al 2008). The fact that the windows were open and the air-conditioning systems were off is of little relevance. During the summer people in the UK often drive with their windows open, and if the windows were closed and the air conditioning was turned on it is not clear that this would necessarily reduce such transfer of resistant bacteria. We do accept, however, that the proximity of the A50 to the proposed site means that for all except the occupants of the relatively small number of properties that share the same access road, the overall risk is not likely to be greater per pig transported than the risk from other intensive farms of a smaller size.

In relation to the local inhabitants, however, we feel the figures do indeed speak for themselves. It is not clear from the planning applications whether the holding will also be buying in breeding stock and whether lorries returning from the abattoirs will come back washed and empty or will be used to transport 'back-loads' of animals to any extent to increase fuel efficiency. Potentially, however, two HGV movements a day, one in, one out mean that there will be between 520 and 730 movements each year – say between 5,720 and 8,030 HGV lorries moving through the area in the time between a local child being born and leaving for secondary school.

Your third objection to our client's planning application, namely that, '*Many of the diseases of concern can be passed in other ways. About 25% of pigs in this country have salmonella and in addition to passing through food this can pass to humans via water run off, the spreading of manure on land or flies travelling from farms to local houses*' is yet another piece of misleading supposition based upon research relating to different farming processes. Raising this point as an objection takes no account of the fact that the manure from the proposed unit at Foston will not be put directly onto the surrounding land. It will be processed through a bio-digestive process that takes the temperature of the manure up to 46 degrees for a minimum of 72 hours. This process produces an odourless, pathogen free, rich and easily absorbent fertiliser which has few similarities to the manure identified in the research that you seek to rely on. The pigs at Foston will also be kept indoors which, as you must know, has a significant bearing on the reduction of salmonella clusters in herds. Again, had you sought a dialogue with our client before publishing your objections you would have become aware of this fact.

As mentioned above, most scientific research has found that high herd numbers increase levels of salmonella in pigs. According to a report in the Derby Telegraph, Martin Barker, the Managing Director of Midland Pig Producers, told journalists in July this year that 'Pigs kept outdoors are less likely to be healthy – at risk from salmonella for example' (Anon, 2010). This is not supported by the evidence. Relatively few studies have made a careful comparison of the levels of salmonella in indoor and outdoor pigs, but research carried out by the Danish Institute of Agricultural science has found that while the level of salmonella seroprevalence was identical on indoor, organic and non-organic outdoor pig farms, the level of salmonella shedding both on farm and at slaughter were substantially lower in the organic and non-organic outdoor pigs. They state, 'The results showed a low level of on-farm Salmonella shedding (<0.2 %) in organic and conventional outdoor herds compared to 2.5 % in indoor pigs (P<0,0001), and also a lower prevalence of Salmonella shedding in outdoor systems at slaughter (<2 %) compared to 4.1 % in indoor systems (P<0,01) (Bond and Sorensen 2007).

In relation to the various routes by which salmonella can spread, our concern related more to the possible spread of salmonella from pigs to humans by house flies, rather than to other animals, as assumed in Carter Ruck's response. In the same article, the Derby Telegraph's reporter commented on the large number of flies in the room with farrowing pigs, something which Mr Leavesley pointed out was 'down to the damp weather'. As Mr Leavesley is doubtless aware we get rather a lot of damp weather in the UK. We are not aware of any research which has looked specifically at such a route of transmission and we are therefore obviously not in a position to quantify such a risk, but our concern is that there is ample evidence that flies can carry salmonella and with such a large number of pigs being housed in one location there must be a risk that at certain times of year, during certain weather conditions, numbers may reach very high levels and that as such flies may travel between the pig buildings and residential premises in the area where they could directly contaminate food.

In relation to the spreading of manure, we recognise that, providing the biodigestion plant does not break down and require to be opened or emptied – a possibility which we feel must be contemplated – the end product from the digestion process should be free of viable salmonella bacteria. However, while the temperature of 46 degrees cited by Carter Ruck is adequate to kill many pathogens, it is not high enough to kill Clostridium difficile spores.

Researchers at the University of Guelph in Canada who have found C. difficile spores in retail pork, state, 'We quantified the thermal inhibitory effect of 71 degrees C (recommended for cooking ground meats) and re-heating at 85 degrees C, on food- and food-derived Clostridium difficile spores. All C difficile strains tested (n+20) survived 71 degrees C for 2 h, but 90% died within 10 min when re-heated at 85 degrees C.' (Rodriguez-Palacios et al. 2010). C. difficile is a growing problem in pigs worldwide, and the latest research shows that the pathogen is now present in British pigs (Brunton et al. 2010). The ribotype present in pigs, predominantly ribotype 078, has recently become an important emerging ribotype in human medicine. Scientists from the Netherlands have noted that in that country, cases of ribotype 078 in humans are much more common in pig-farming areas than in non-pig-farming areas (Goorhuis et al. 2008). While studies in Canada have found C. difficile on pork meat, the few similar studies in the EU have not found such contamination, possibly due to higher standards of hygiene in European abattoirs. This, however, suggests that in the UK and other EU countries C. difficile may be spreading from pig farms to humans through the environment and in this context the exceptionally large quantities of pig waste that will be transported and spread on land in the area suggests to us that local inhabitants may be at an increased risk of infection. It should be noted that while it is commonly perceived that C. difficile is simply a hospital superbug, its incidence in the community has greatly increased in recent years and some hospital outbreaks have been traced back to the community.

As with the previous objections, your assertion regarding the risk of disease passing from pigs to humans is not accompanied by any assessment of that risk. Without any such assessment your objections simply mislead and distort and are irresponsible coming from the perceived authority of the Soil Association. In the absence of any risk assessment it becomes all the more important to place your objections within the context of the current debate. For example, please confirm whether, at the time that your objections were sent on 12 August 2010, you were aware of the following:

I. Research that suggests the presence of resistant non–*E. faecalis* in up-gradient surface water indicates that additional sources of resistant bacteria may exist in this environment. These sources could include human septage, companion animals, wild animals, and migratory waterfowl such as Canada geese (Middleton and Ambrose 2005; Sayah et al. 2005);

II. The British Pig Executive's citation of research that demonstrates the spread of Salmonella by flies is a theoretical risk. Researchers found that when contaminated flies were released into a room containing previously unchallenged hens it failed to result in colonisation of any of the subject birds.

If you were aware of these lines of enquiry before publication can you please provide an explanation as to why you did not feel the need, at least to refer to the existence of such research and viewpoints?

We were aware of other potential sources of resistant enterococci – here Carter Ruck is simply quoting from a paper that we referenced (Sapkota et al. 2007). It should be noted that the same paper also found statistically significant higher levels of enterococci and of resistance in enterococci in surface and/or groundwater downgradient of the intensive pig farm. The scientists concluded that this provided additional evidence that water contaminated with swine manure could contribute to the spread of antibiotic resistance. The fact that resistant enterococci were also present, at generally lower levels, upgradient of the intensive pig farm does not change this conclusion. The conclusion of the paper states: 'Swine manure management practices, as well as swine feeding practices such as the administration of nontherapeutic levels of antibiotics in swine feeds, continue to pose both environmental and public health challenges, particularly in the immediate environment of

swine CAFOs [Concentrated Animal Feeding Operations], where vast amounts of swine manure are produced and applied to agricultural fields.'

4. Levels of campylobacter

The basis for your objection that, '*Levels of campylobacter in pigs are also high and additionally often also carry resistance to one of the only two antibiotics that can be used to treat serious cases in humans*' is deeply flawed. It is thoroughly misleading to draw the inferences that you do from the Danish research on which we assume you base your objection as that study took samples from cattle and poultry as well as pigs. Whilst our client makes no criticism of the research itself or the techniques involved we are concerned that you should seek to place such reliance as you do on a piece of research that did not take its own samples but used information supplied for different research and interpreted their results for its own use. At the very least you should have made reference to that fact when seeking to draw inferences from the research.

Furthermore, the 2005 study by Thakur and Gebreyes published in *Journal of Clinical Microbiology* was based on limited research (100 samples only) and against the background of different farming methods in America.

On behalf of our client we draw your attention to the 2002 Paper[1] by David Birch BVetmed MRCVS, former President of the UK Pig Veterinary Society in which he gave a risk assessment stating, '*The transmission of Campylobacter infections from meat to man is considered one of the major routes of spread, along with water contamination, of this increasingly common form of infectious intestinal disease. To make a risk assessment of the likely transmission from pigs to man, a database was established from a variety of references, as there was much variation in the data and few were sufficiently complete to allow for a quantitative assessment to be made. It was noted that erythromycin resistance was very high in pigs for both C. jejuni and C. coli in comparison with man and chicken, thought to be one of the major sources of infection and that this would act as a possible marker to determine the transmission rate of campylobacter spp. from pigs to man. There was no evidence of transmission of C. jejuni from pigs to man, as the organism was rarely isolated in pigs (4%) in comparison with chicken (90%) and man (92%) and resistance rates were very low at 2% in man, chicken 4% and 35% in pigs. With regard to C. coli, isolation in pigs is very high (96%) but low in chicken (10%) and man (8%) and erythromycin resistance in man (15%) is similar to chickens (15%) but much lower than in pigs (57%). This confirms that pig meat and environmental contamination by slurry / waste from pigs via water can be considered either a no risk or very low risk in the transmission of campylobacter infections to man and therefore also a no risk or very low risk in the transmission of antimicrobially resistant strains to man.*" Please also confirm whether you were aware of this paper before publishing your objections on 12 August 2010.

Yes we were aware of this paper, which very clearly confirms our claim that 'levels of campylobacter in pigs are also high [96%+] and additionally also carry resistance to one of the only two antibiotics [erythromycin] that can be used to treat serious cases in humans'. It is very odd therefore, that Carter Ruck seek to question this by dismissing the relevance of the two papers we quote. As their client must be well aware, there are of course many more scientific studies which have found high levels of resistant campylobacter in pigs.

While we accept that poultry are a more important source of campylobacter infections for humans than pigs (particularly in the case of C. jejeuni), the epidemiological evidence does provide evidence that pigs are also a source of C. coli and other types of campylobacter. In relation to the cited paper of David Burch's from 2002, we respect his scientific work and fully accept that his paper was an accurate analysis of the data then available on one (albeit) important aspect of ongoing research. Antibiotic resistance trends since then, and the publication of new research and data, suggest that his conclusion that there is a low risk or no risk of antimicrobial-resistant campylobacter being transmitted from pigs to man was premature. We note, in particular that:

- although David Burch pointed to the much lower level of erythromycin resistance in campylobacter coli from humans and poultry as compared with pigs as evidence that pigs were not significant sources of human infections, the government's 2008 overview of antibiotic resistance in humans and farm animals reported that erythromycin resistance in human C. coli has risen to 54% (Agri-Food and Biosciences Institute et al. 2007). This is close to the level found in pigs and much higher than the level previously found in poultry.

- a recent British study (Sopwith et al. 2010), which used a method of classifying campylobacter known as MLST on 96 human isolates of Campylobacter coli found 36 distinct sequence types. The majority of the isolates (49) were one of eight sequence types which previous studies had found were present in pigs. These eight sequence types were also found in poultry, so while this does not prove that pigs were the origin of these human infections, it shows that despite some earlier claims to the contrary, there is a large overlap between human and porcine sequence types and further research is still needed.

We also note that another David Burch article, published in 2002 on his own website (http://www.octagon-services.co.uk/articles/salmonellaPJ.htm), quotes a study by PHLS scientists reviewing foodborne outbreaks of salmonella and campylobacter in the UK between 1992 and 1999. They report two outbreaks of campylobacter caused by pigmeat, only one of which was linked to cross-contamination.

It is also important to note that the clinical significance of campylobacter species other than C. jejeuni and C. coli is believed to be 'widely underestimated due to inappropriate isolation procedures' (Gorkiewicz et al. 2002). This is because 'cephalothin is a constituent of many Campylobacter selective media, and thus cephalothin-sensitive campylobacters, such as C. hyointestinalis, C. fetus, and C. upsaliensis are underdetected' (Gorkiewicz et al. 2002). In fact, according to some scientists, 'campylobacteria other than C. jejeuni, C. coli, and Campylobacter lari are too sensitive to the antibiotics in most conventional selective media to be isolated in routine laboratories' (Enberg et al. 2000). In addition, some campylobacter species, including C. hyointestinalis, require incubation in a hydrogen-enriched microaerobic atmosphere to enable recovery (Enberg et al. 2000).

Furthermore, while C. jejeuni and C. coli overwhelmingly cause gastrointestinal infections in humans which do not usually require antibiotic treatment, except perhaps in the young, the old and the immunocompromised, some of these underdetected campylobacter species, such as C. fetus and C. hyointestinalis more frequently cause extraintestinal infections, including bacteraemia, requiring antibiotic treatment.

Two French studies, and a study from Hong Kong, have found that over 50% of campylobacter bacteraemia in the respective countries were caused by C. fetus (Gallay et al. 2007, Pacanowski et al. 2008, Woo et al. 2002). The French research showed that C. fetus affected the elderly and immunocompromised much more frequently (Gallay et al. 2007, Pacanowski et al. 2008), which is significant since these are the patients which often require antibiotic treatment. In the UK, research from the early 1990s found that C. fetus was already responsible for 8-10% of bacteraemia cases (Healing et al. 1992).

C. fetus and C. hyointestinalis have both been found in pigs (Gorkiewicz et al. 2002, Tu et al. 2001) and the transmission of C. hyointestinalis from a pig to a human has already been documented (Gorkiewicz et al. 2002). In the UK, C. fetus has been found on retail pork

(Little et al. 2008) and in retail porcine liver (Kramer et al. 2000). While ruminant farm animals are also a probable source of human C. fetus, it has been shown that poultry are not likely to be a significant reservoir for these infections (Kempf et al. 2006). Since antibiotic resistance levels in porcine campylobacter can generally be expected to be higher than in cattle and sheep, due to the much higher levels of antibiotic use in pigs, it follows that pigs should be considered as a potentially important source of antibiotic-resistant campylobacter infections in humans which require antibiotic treatment.

Campylobacter, including human campylobacter can also acquire resistance genes via horizontal gene transfer, with natural 'transformation' and 'conjugation', two well-recognised mechanisms for such transfers in campylobacter (Luangtongkum et al. 2009). Genes encoding resistance to fluoroquinolones and macrolides (the two most important antibiotic classes for treating human campylobacter infections) can be transferred to campylobacter via transformation (Luangtongkum et al. 2009). Experiments have shown that porcine C. coli can act as a donor of erythromycin resistance genes which can be acquired by transformation (Kim et al. 2006). The presence of macrolide-resistant porcine C. coli in the human gut could therefore have human-health implications, even without these C. coli directly causing human infections. Since porcine C. coli are generally more macrolide-resistant than C. coli from other farm animals, they should be viewed as a potentially major reservoir of macrolide-resistance genes.

In any event we also wish to make it clear that the use of antibiotics is not in widespread use on our client's farms in any event and any antibiotics that are administered are done so under Veterinary supervision on similar lines to the Soil Association's model.

This comment on the Soil Association's standards seems both gratuitous and reveals considerable ignorance of organic livestock farming.

With the exception of ionophore coccidiostats, all antibiotic use on all farms is now under veterinary prescription. This does not, however, mean that antibiotic use on intensive pig farms is not still many times higher than it is on organic pig farms. While organic farmers are permitted to use antibiotics therapeutically to treat disease, organic farms are only certified as organic if the production systems include a significant number of fundamental features specifically included to reduce the likelihood of disease arising. In addition, except in very limited circumstances, organic farmers are not allowed to use antibiotics prophylactically. In contrast, most non-organic pig producers still use antibiotics prophylactically, many on a routine basis. A survey of pig producers in Great Britain published in 2007 looked at three different production models (all non-organic) and found that between 60% and 75% of producers reported having used antimicrobials in weaner feed in the two weeks before they completed the questionnaire (Stevens et al 2007). Such use is not permitted on organic farms.

It is therefore not surprising that Defra-funded research has found that antibiotic use on certified organic pig farms was just a tiny fraction of the antibiotic use on conventional farms, even when growth-promoter use was ignored (Defra 2006, see Figure 1).

Organic standards that govern the conditions in which animals must be kept are intended to ensure that it is possible to raise healthy pigs with little antibiotic use. The intensive conditions on your client's proposed farm come nowhere near meeting these standards. Furthermore, the Soil Association requires that much longer withdrawal periods for antibiotics are used than is required on non-organic farms. As well as reducing the levels of antibiotic residues in food, this also helps to ensure that lower levels of antibiotic resistant bacteria are present at slaughter (Delsol et al, 2004). We doubt whether Midland Pig Producers is going to meet this organic standard, but we are happy to be corrected if we are wrong. If we are right, the claim that antibiotics will be used along similar lines to the Soil Association's model is simply wrong.

5. Streptococcus suis

The fifth objection raised in your email dated 12 August 2010 is that streptococcus suis, '*is widely found on pig farms, mostly in very young piglets. It is seen as an emerging human pathogen worldwide and the second most common cause of streptococcal meningitis in humans. The fact that it has not been seen as a major problem in the UK, while it has been in e.g. The US, Thailand and the Netherlands, may be because we have not so far had such large pigs farms in the UK*'. Your speculative correlation between the spread of streptococcus suis and the size of pig farms is misconceived and inaccurate.

According to the Government's Health Protection Agency *Streptococcus suis is, 'an important pathogen of pigs, is endemic in most pig-rearing countries of the world, including the UK* [our emphasis]. *The organism is carried in the tonsils of pigs, and pig-to-pig spread is mainly by nose-to-nose contact or by aerosol over short distances.*' However, you should also be aware that Human infection with *Streptococcus suis* is rarely reported and only about 150 cases have been reported from the world literature. People in direct contact with pigs or pig products are considered at risk. Human infection is thought to occur mainly via cuts or abrasions when handling infected carcasses. The size or intensity of the farming is therefore only one factor to be considered in any risk assessment.

Resistance to penicillin has been reported for *Streptococcus suis* in some countries but not in England and Wales to date. We remind you of the Soil Association's Richard Young's letter to the Veterinary Record in 2009 in which he recognised that certain antibiotics should be available for use in animals where it is known that no alternative antibiotic would be effective. He wrote, '*We introduced additional restrictions on the use of fluoroquinolones in 2004 and extended-spectrum cephalosporins on January 1 this year; however, we decided against a ban to avoid occasional treatment failures and associated welfare problems.*"

We recognise that the size or intensity of the farming is only one of several factors that need to be taken into account. This, however, does not detract from the need to consider this factor. Porcine Streptococcus suis meningitis has been found to be most prevalent in intensive, total confinement systems with high population densities (Tokach 1993). We are aware that the strains of Streptococcus suis currently causing a significant number of cases of human infection in Asia are believed to be more virulent than the strains currently present in European or US pigs. Nevertheless, serological data from research in the US suggests that human Streptococcus suis infections occur more frequently than previously thought (Smith et al. 2008). In the past menigititis caused by Streptococcus suis has been mistakenly attributed to enterococci, listeria and several other types of streptococcal infection. It is also often the case that more virulent strains of infection that develop on one continent eventually spread to others. Furthermore, as acknowledged in Carter Ruck's letter, people in direct contact with pigs or pig products are at risk. While the risk is clearly greatest for those who work with pigs or pork meat on a daily basis, a large number of consumers also handle raw pork in their kitchens from time to time. The size of the proposed development at Foston also means that there is likely to be a higher than average number of pig workers living in the area.

As with other comments on the use of antibiotics in organic farming systems, it appears that a lack of background awareness of the way in which antibiotics are used on organic farms and the way in which standards are applied, has led Carter Ruck to draw conclusions from Richard Young's letter which are not correct. His letter refers exclusively to the use of antibiotics for treatment, not preventative purposes. The two classes of antibiotics referred to in the letter are fluoroquinolones and the extended-spectrum cephalosporins. Both these

classes have specific restrictions applied to them when used on Soil Association certified farms. Standard 10.9.7 of the *Soil Association Organic Standards for Producers* states, 'You must **not** use:
• antibiotics on a whole herd or flock basis to prevent disease, or
• fluoroquinolone antibiotics except with our permission and only to treat individual animals.
Note – the following drugs are licensed fluoroquinolones in the UK: Enrofloxacin, Danofloxicin mesylate, Danofloxicin hydrochloride and Marbofloxacin. Please liaise with your vet to clarify the type of antibiotic you are using, as this is not a complete list and the range of drugs may change.
Standard 10.9.8 states, 'From 1 January 2009 you must **not** use third and fourth generation cephalosporin antibiotics except with our permission and only to treat individual animals. We strongly recommend that you limit your use of these antibiotics before this date if possible.

Note – the following drugs are licensed third and fourth generation cephalosporins in the UK: Ceftiofur, Cefoparazone and Cefquinome.'

Our concern about the use of ceftiofur (Naxel and Excenel) on intensive pig farms to control Streptococcus suis is that this is frequently undertaken on a prophylactic basis, and that some UK pig farmers are already using it in this way to control Streptococcus suis infection, even though strains present in the UK are currently still sensitive to penicillin, as pointed out.

6. Naxel and Excenel

Our client does not use either Naxel or Excenal on its farms and has not done so for at least 5 years. Raising this as an objection merely highlights how ill-conceived it was to publish your objections without seeking to confirm the true facts with our client beforehand. It also highlights the way in which you have sought to shoehorn broad concerns about farming policy into a specific planning application process which is both inappropriate and irresponsible.

We are pleased to hear that Midland Pig Producers do not currently use Naxel or Excenel, and have not done so in the last five years. We wonder, however, if the company is willing to give an assurance that it will not use these antibiotics (or any antibiotics containing ceftiofur that become available) prophylactically in future, if penicillin-resistant strains of Streptococcus suis emerge? Such an assurance would be well received, and would indicate an acknowledgement of the real and growing problem of antibiotic resistance amongst farm animals, particularly intensively reared animals.

7. *MRSA*

As you acknowledge, the new strain of farm-animal MRSA has not yet been found in England or Wales. The EFSA EU-wide survey of breeding pigs found no MRSA in the UK breeding or production herds and our client's farms have all tested negative to MRSA. Notwithstanding that our client shares the Soil Association's concerns about the associated risks of this strain of MRSA. It is for that reason we are very concerned at the reliance and credibility you seek to place on a single, limited study into one farmer and a single farm.

The aim of the study was to find the source of MRSA in the family of a pig-farmer that had no known risk-factors for carrying MRSA. The study concluded that there was a clonal spread and transmission between the farmer and the pigs in that case. The broader implication, according to our client, is that there is a possibility that MRSA isolates characterised by *spa* type t108 (or related *spa* types) and MLST ST 398 might be of international importance as pig-MRSA. This type was previously shown to be present among epidemiological unrelated MRSA isolates from French pigs and pig-farmers.

Before drawing inferences for national policy let alone an individual farm's management there has to be further research to evaluate the prevalence of MRSA in farming animals as well in the humans working with them, (e.g. farmers and veterinarians). We have no doubt that the Soil Association shares our client's concerns and its impatience for further research and guidance. In the absence of more conclusive research, however, the Soil Association should take great care in the way in which it portrays the risks. The simplistic connection between the potential risk shown by a single limited study in the Netherlands and the '*large number of workers*' who, '*will need to* live locally' to Foston is unhelpful and misleading. Again we are astonished that you should see fit to make such serious and potentially damaging claims without acknowledging the paucity of research and with a risk assessment based on nothing more than loose and facile language such as, '*highly likely*', '*high risk*' and '*significant risk*'.

We also welcome the fact that Midland Pig Producers are concerned about the risks of porcine MRSA and agree that further research is needed. We first called for more research in December 2006, and restated this in July 2007. However, it is wrong to suggest that we have based our concerns on one scientific paper alone. Despite the lack of research carried out in the UK, there has been a vast international literature published about pig MRSA in the last few years. In 2007, the Soil Association published an 86-page review of the scientific evidence (Nunan and Young 2007). Since then many more studies from around the world have been published. These are far too numerous to list here, but include studies from the United States, China, Spain, Italy, France, the Netherlands, Switzerland, Denmark, Portugal and many more.

While MRSA ST398 is the dominant pig strain in Europe and the United States, in China it is ST9 (Cui et al. 2009). In Italy, ST1, spa type t127, is also common in pigs (Battisti et al. 2010). This is potentially significant because ST1 t127 is the most common MRSA found in humans in the community in the UK (Otter and French 2008). While we are not suggesting that the high prevalence of ST1 in the community in the UK is due to pigs, we believe this shows that ST1 t127 is a pig strain which readily infects humans and can also be transmitted from human to human. Therefore, the presence of this strain which has now been found in Europe in pigs in Italy, Spain and Cyprus is a serious human-health issue and has the potential to become a greater problem in years to come.

Although MRSA ST398 is not as readily transmittable from human to human (which has limited its human-health impact to date), it has nevertheless, already caused many human

infections, including skin infections, respiratory-tract infection, and life-threatening conditions such as endocarditis and bacteraemia, some of which have been fatal (Schijfflen et al. 2010, Cuny et al. 2009). It is now well established that people working with MRSA-positive pigs, such as farmers, veterinarians, and even their family members, are at risk of colonisation and infection (van Loo et al. 2007, Krziwanek et al. 2009, Cuny et al. 2009).

8. Other pig diseases of concern to humans

Yet again we are concerned by the wilful distortion created by the following objection, '*This is by no means a complete list of pig diseases of concern to humans, most of which will have enhanced potential to cause problems due to the very large number of pigs to be housed together*'. No attempt has been made at all to relate this sweeping generalisation to the facts of our client's specific application. Again the objection appears to be based on American style management systems. No similar research has been carried out in respect of UK assured systems such as that adopted by our client that do not permit the same levels of stocking densities, diet additives or blanket use of antibiotics without veterinary supervision and without regular 3-monthly heard inspections, for example. Furthermore, the proposed site at Foston will combine the use of new technologies which are not currently in general use anywhere else in the world. A consultation with Professor Edwards (who is referred to above) and other qualified experts has suggested that combining these technologies will reduce risk to human health.

We are happy to provide Midland Pig producers further details of pig bacteria or viruses of concern to humans, although we had assumed that this information would be available to them. They include:

- Hepatitis E
- Yersinia enterocolitica
- Swine flu
- Vertoxigenic E. coli, including E. coli O157
- Clostridium difficile, which is now known to be present in British pigs (Brunton et al. 2010).

In relation to pig diseases and antimicrobial use on Midland Pig Producers' proposed new enterprise, and the relevance of this to human health, the issues are discussed in earlier sections of this paper, but in summary our view is that nothing in the proposals is sufficient to compensate for the increased risks associated with a unit of the size contemplated.

9. Genetically engineered protein in pig-feed

A further objection to our client's planning application is that, '*much of the protein included in non-organic pig feed is now genetically engineered*'. It is apparent that you have made no attempt whatsoever to engage in the specific details of our client's application. If you had, you would have seen reference to our client's "green circle" scheme that involves growing crops locally, milling them on site and feeding them directly to the pigs. The scheme is being trialled with the specific purpose of including locally grown beans to mix into our client's pigs' diet. DEFRA is funding these trials of using home grown protein (peas and beans) as a replacement for Soya and Genesis are major sponsors along with SAC, Notts University and others. MPP are contracted to carry out the farm scale trials in the "Green Circle" prototype at Stafford. Doubtless you are aware that the Soil Association is a partner in this project and will no doubt benefit from the trials. We should also point out that soya is used by organic farmers too.

Your objection continues with the following, '*Typically it come from crops of GM soya grown in the US, or South America where it is increasingly grown on former rain forest land that has been cleared for agriculture, or the tropical savannah known as the Cerrados which is amazingly rich in biodiversity and indigenous cultures, but which is being ploughed for agriculture twice as fast as former rain forest land, at enormous environmental and human cost. In Brazil alone, approximately 10,000 hectares of Cerrodos are irreversibly lost every day, along with 5,000 hectares of rainforest.*'

This objection is yet another example of the way in which you have sought to manipulate the planning application process to provide a platform to make criticisms of current farming methods at the expense of our client's reputation and its application. Such objections merely serve to undermine the credibility of the Soil Association.

We acknowledge our mistake on this point. However, it is not clear from the details in the planning statement prepared by Fisher German for Midland Pig Producers that the proposal to use locally produced feed extended to all protein and all other derivatives of soya, as well as cereals. Nor is this clear from Carter Ruck's letter, which refers to a scheme being 'trialled'. Nevertheless, we applaud this initiative and hope that in any event Midland Pig Producers will extend this approach to its existing pig farms.

10. The build up of antibiotic resistance genes

On behalf of our client we reiterate that it does not use antibiotics frequently in the diet provided to its pigs. As you know, if any antibiotics are administered to any animal they are done so under the strict supervision of a vet who, in any event, is required to visit and review the herd at least once every 12 weeks, under the Assured Food Standards

We again remind you that the Soil Association permit the use of the same antibiotics on its own herds in exactly the same way under a vet's supervision. Please also note that outdoor herds, by definition, have more contact with local wildlife. Indoor pigs have far less, if any, interaction.

Regarding the attempts to equate antibiotic use on conventional intensive pig farms with that on organic pig farms in the UK, it is of note that the Defra-funded study referred to above (Defra, 2006) found much lower levels of antibiotic use on organic pig farms.

Furthermore, statistics published by the Veterinary Medicines Directorate show that, despite the ban on the growth promoters, antibiotic use in British pig farming remains exceptionally high. Unfortunately data is not available to allow a comparison of antimicrobial use between all indoor and all outdoor pig farms. However, even though there are fewer than 5 million pigs in the UK, and over 33 million sheep, it is worth noting that pig farming accounts for approximately 60% of all UK farm antibiotic use, and sheep farming accounts for less than 0.3% (VMD 2010). This means that use per animal is about 1,500 times higher in pig farming than it is in sheep farming. These statistics help to illustrate the fact that, even though veterinary prescriptions are now required, antibiotic use remains high. Furthermore, many of the antibiotics still used as growth promoters in pigs in the US (penicillin, tetracyclines, macrolides and lincosamides) remain available as feed additives for prophylactic use in the UK, so long as a veterinary prescription is obtained.

A recent European study provides further evidence that antibiotic use in British pigs is particularly high. It compared veterinary antibiotic use in different European countries per kg of biomass of slaughtered pig, poultry and cattle and estimated biomass of live dairy cattle. The authors pointed out that of the 10 countries, the UK had the smallest proportion of its biomass accounted for by slaughter pigs, and that since antibiotic use is generally highest in pigs, they would have expected the UK to have the lowest overall antibiotic use. Instead, the UK's antibiotic use was the third highest (Grave et al. 2010).

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