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O'HALLORAN: File on 4 has learned that an outbreak of flu among pigs in America in 1998 is now seen as a forerunner of the current virus in humans. So were early warning signs of a flu danger from pigs missed as long as ten years ago?

SIGNATURE TUNE

ACTUALITY – RURAL SOUNDS

O'HALLORAN: The coastal plain of North Carolina, where the patchwork landscape once contained thousands of small, family farms. But in the 1980s and 90s, traditional farming was overtaken by industrial scale methods. And in no sector did the intensive system have more impact than in pig farming. The pig population rocketed from around two million to ten million, finally outnumbering humans in the state. But you don't see so many animals in the fields. That's because most are housed inside inside huge farm buildings.

ACTUALITY IN BARN

O'HALLORAN: This pig barn is about 60 metres long and about 12 to 15 metres wide and it's divided into a whole series of breeze blocked off pens. And each pen is fairly full of young pigs of about six weeks old. The conditions in here are fairly smelly. The excrement produced among the pigs, the urine goes down through the floor. The pigs are rather dirty-looking, there are a lot of flies. The pigs stay here for about 12 or 13 weeks – they grow to full size and then they are ready for slaughter.

The owner, Chuck Stokes, a squarely-built giant of man, has four industrial farms with up to 20,000 pigs. He says he insists on tight bio-security and he takes rigorous precautions to prevent viruses being brought in from outside. But what about the sheer numbers of animals concentrated in one place?

Looking here one might say the pigs look fairly crowded in here. Do you accept that?

STOCKS: No, the pigs in confinement here don't do well if they're overcrowded. We try to provide a space for them that are comfortable for sleeping, eating and socialising.

O'HALLORAN: You don't see them as overcrowded, but of course it would be very different if they were being kept in the traditional methods presumably?

STOCKS: Absolutely, but let's remember the development of confined feeding operations was brought on by the general public's demand for high quality, low cost meat. But remember, pigs are not going to produce if they are uncomfortable, and these pigs were born on concrete, they were nursed on concrete and they will finish on concrete, so as you can see they are quite content.

O'HALLORAN: But others are not so content. The industry, which turns over billions of dollars a year, sits cheek by jowl with poor rural workers, often African Americans. And, as in one area we visited 60 miles away in Duplin County, even if they can't see the giant hog farms, they can hardly forget they are there.

ACTUALITY IN FIELD

O'HALLORAN: I'm standing on land owned by an African American farming in the traditional way here in Duplin County, but next to his farm, 200 metres away, there are some very large industrial pig units. Between me and them is a lagoon. A lagoon conjures up an image of clear water, blue sky, a place in the sun. But this lagoon has a stench to it. Leading into the lagoon from the pig units are large pipes bringing all the urine and excrement from the pigs. These lagoons – or cesspits – have come to spell something very unpleasant for a number of people living close to these industrial pig farms.

BARON-HALL: The odour is just so horrible – it's such a stench that it's really hard sometimes to be outside and be near that stench. There are hundreds upon hundreds that I am aware of who say they have a problem with it and it's usually right in their back yards.

O'HALLORAN: Dothula Baron-Hall, who runs a community health group, says life has been made a misery for many people living near industrial pig operations. Mostly because of the way that waste from the lagoons is piped away and sprayed by powerful jets onto nearby fields.

BARON-HALL: Some people who live near the hog farms, I mean within 100 feet, have said that when the farmers are spraying, the spray gets on them, their houses, their cars, their clothes on the line, their laundry, so it's a really big problem in several different ways. There is sort of a thread that goes through everybody's story about the fact that they have problems with breathing, they have problems with their lungs, their eyes, they itch and they burn and sometimes their eyes water. So I hear these kinds of stories over and over again.

O'HALLORAN: She and some environmental groups also complain that waste runs off the fields into local streams and can get into ground water affecting wells. Two years ago, North Carolina legislators voted to ban the building of new waste lagoons. Some industrial scale farmers have responded by taking their own measures to modify the lagoon system.

ACTUALITY WITH ENVIRONMENTAL EQUIPMENT

O'HALLORAN: Back at Chuck Stokes's pig farms, experimental equipment has been built to cut down the impact of the pig waste on others. Hundreds of thousands of dollars have been spent on the new technology, to dry out the solid waste and allow it to be disposed of further afield, away from the local waterways. Chuck Stokes concedes intensive pig farming carries an environmental cost, but he says he's keen to reduce it.

STOKES: I think that we need to acknowledge the fact that there are more hogs, more chickens and more cattle here in Eastern North Carolina than the good Lord put here.

O'HALLORAN: Do you see any prospect of really getting rid of lagoons and the cesspits and the problems they create for local people in the next few years, say?

STOKES: In the next few years, no I don't. I think people have to realise that there's not enough construction equipment on the east coast to do away with lagoons overnight, so nobody's going to wave a magic wand and all of the lagoons are going to go away.

O'HALLORAN: Moreover, the industry group representing intensive pig farmers, challenges the claim that they are damaging the environment in the first place. Dr Liz Wagstrom is Head of Science and Technology at the National Pork Council.

WAGSTROM: In most states, including North Carolina, manure from large production facilities is highly regulated, unlike manure from small production facilities. There's also good production practices and manure management practices that would encourage producers to try to apply that manure at a time when there is very little likelihood for run-off, and so those are the best practices that can be used. Obviously, we need to encourage all producers to follow those practices, whether they are large enough to be regulated or whether they are a small producer.

O'HALLORAN: What about the impact on, some people living near industrial pig farming operations have reported unpleasant symptoms and a life made a misery of really by an awful smell coming from some of these farms?

WAGSTROM: I've also heard that as well. What we don't know is if those symptoms that they discuss are caused entirely by exposure to swine odour. We do know that the industry is looking and working hard in many ways to look at how to reduce odour, how to best manage manure.

O'HALLORAN: But the pig farming industry has now come under pressure from another direction.

EXTRACT FROM NEWS BROADCAST

NEWSREADER: A deadly flu outbreak spreads beyond Mexico, as health officials warn of a possible global pandemic. Dozens have died, more than ...

O'HALLORAN: The worldwide swine flu alert in April began after thousands of rural people fell ill in Mexico. Local fears were expressed about the role of large industrial pig farms in the region of the outbreak. Some are jointly owned by the biggest firm in the business, Smithfield Foods. But it said that after conducting tests, it had found no signs of the new flu virus in any of its pigs or workers. Yet in America, suspicions

HANDY: If you look at the really scary outbreaks of bird flu or avian influenza that were seen in South East Asia around the late 90s and the early 2000s, those were really lethal in humans, but all of the cases that were seen were acquired direct from birds. The pig represents something referred to as a mixing vessel that provides an opportunity for influenza isolates that came from birds to mix and re-assort their genes with those of pig origin and those of human origin. Pigs and humans, both being mammals, can pass their strains of influenza back and forth between humans and pigs fairly readily, fairly easily. Infection of a pig provides an opportunity for those viruses to come up with a combination that is particularly lethal in the human population.

O'HALLORAN: This has reinforced suspicions in some quarters that intensive pig farming could be increasing the risk of transmission to humans. The role of all livestock in industrial farm units also came under scrutiny in a national study published in April last year. The report, by an expert commission, took two and a half years to complete and was funded by the Pew Charitable Trusts, a non-profit group. The inquiry team included farming and veterinary experts and a former US Agriculture Secretary. They raised the issue of how viruses and pathogens could be spread.

READER IN STUDIO: The continued cycling of viruses and other animal pathogens in large herds or flocks increases opportunities for the generation of novel viruses through mutation ... that could result in more efficient human to human transmission.

O'HALLORAN: The Executive Director of the Pew Commission, Bob Martin, believes that warning, issued a year before the flu outbreak in Mexico this April, was prophetic. He says some of the team were taken aback by the dense concentration of animals in some pig farming operations.

MARTIN: The Commission was very concerned specifically about concentration of swine, and swine are incredible incubators for viruses. They're susceptible to swine flu obviously, avian flu and human flu. And when these animals are snout to snout, at very close proximity, very warm barn, they can readily pass the virus back and forth. And because of the people being in the barn for an extended period of time, they can pass it back to the human worker and then back to the pig. So they generate a novel virus, it's called.

O'HALLORAN: And you heard about that from virology experts, did you?

MARTIN: Yes we did. We heard from a team at the University of Iowa School of Public Health. At the time, one of our commissioners was a Dean of the School of Public Health, and they came and addressed what a perfect incubating system a concentrated animal feeding operation or an industrial farm is for breeding novel flu viruses.

O'HALLORAN: So was it the view of the virology experts your Commission consulted that these conditions - industrial, intensive pig farming conditions - would amplify the spread of flu viruses?

MARTIN: Yes amplify, and the added problem is that many of the industrial farm operation workers are lower income scale in the United States. They don't have access to immediate health care or screening, and that they would be what we termed a bridging population to bring the virus from the industrial farm out to the broader population.

O'HALLORAN: The current H1N1 flu bug blamed for putting the world at risk of a global pandemic is described as a triple re-assortant virus, meaning it has components from human and avian flu viruses as well as major components from swine. The immediate source of the virus in Mexico has yet to be traced. But one top American expert, Dr David Morens of the National Infectious Diseases Institute near Washington, says it is quite correct to call it swine flu.

MORENS: It's a swine virus, a virus that's descended from two different pig viruses that have been in pigs for a number of years. Over the recent decades, we've documented that farmers and others are not uncommonly infected with pig viruses, but that those viruses don't go on to be transmitted from person to person. And if you had asked most virologists last year, I think the likelihood that a virus circulating in pigs could jump into humans and cause a pandemic, I think most would have said that was unlikely, and yet that seems what we're observing. It certainly is spreading in the direction of being called a pandemic.

O'HALLORAN: But there's great sensitivity in the pig farming industry over the current flu epidemic in humans. In fact, the industry totally rejects the term "swine flu". It blames the phrase for a sharp drop in sales of pig meat for several weeks. And, as a result, the National Pork Council lobbied - successfully - for a change of name says Dr Liz Wagstrom. As a result, for the last few weeks, American public health chiefs have been calling the virus H1N1.

WAGSTROM: Well, obviously we worked closely with scientists and others to ask the questions whether this was an appropriate name. And people within the scientific bodies that were using that term came to the conclusion that, even though there were pieces and parts of this virus that were consistent with viruses seen in swine, that because it was not number one found in pigs and contact with pigs was not associated with infection, that it was better renamed.

O'HALLORAN: We've spoken to an expert at the National Institute of Infectious Diseases and he's adamant that it's basically swine flu.

WAGSTROM: There are genetic components of this flu that are consistent with flus found in pigs; there is no argument about that. Whether this flu itself arose in pigs or recombined in another species, whether it was a bird or a person is yet unknown, and despite looking through a lot of viral isolates from a lot of countries, there has been no identified case of this influenza in pigs except where the Canadian pigs were exposed to a sick person who then brought into a herd.

O'HALLORAN: The National Pork Council denies that pigs are overcrowded in industrial units. And Dr Wagstrom believes that any risk of virus spread being increased by intensive pig farming methods is effectively neutralised by a series of precautions and bio-security measures.

WAGSTROM: If there are a large number of animals in one spot, you have more animals that have the ability to get infected. What is offsetting that is the fact that those animals are segregated from other people, other animals and have limited contact to the number of people that might be exposed to them. So there are pros and there are cons and in my mind the pros very much outweigh the cons.

O'HALLORAN: And what are the pros exactly of keeping, say, 1,200 pigs in a barn and if one animal gets a virus it spreads very rapidly perhaps?

WAGSTROM: Those pros are that you can have a confined system that keeps other animals and other people from being exposed to those animals. You have veterinary care that can quickly diagnose them and provide a standard of care that is needed, so that they can be treated quickly to get over their illness, and you have a level of diagnostics that will allow tracking of those viruses to understand any potential changes and be able to put in place specific vaccination routines for them.

O'HALLORAN: So there's a sharp conflict of opinion on terminology between the industry and some public health experts. But there's less dispute about a crucial series of events in the world of pig farming just over ten years ago. File on 4 has learned that a virus with some close similarities to the one now posing a pandemic threat was found in American pigs as long ago as 1998. At that time, a public health expert from North Carolina, Dr Melva Fager Okun, was completing a thesis on intensive livestock farming when she received some unexpected information.

OKUN: One night I was here at my house and I got a call from an epidemiologist with State Government, quite concerned I would say, saying that something dramatic was happening on a farm in Samson County and that national experts were being flown in, and that he had some concern about not enough public health involvement in that, and gave me the name and a phone number of a person to contact.

O'HALLORAN: Did he know why the national experts were being called in?

OKUN: He knew that national experts were being called in because there was some kind of disease outbreak within the pig herd on that operation that did not meet the classic characteristics of a swine disease.

O'HALLORAN: So what did you do?

OKUN: So I called the person on the phone number that I had been asked to call, hoping to be of some help. So this was seen as a person in charge of this investigation that was going on. And I was shocked to be met with what I would call a fair amount of hostility and surprise and anger that I was calling, and who was I and how had I gotten his phone number, and why was I calling. I felt like I'd called into some very secret operation.

O'HALLORAN: What did you learn about the reason for all these experts being flown in?

OKUN: What I learned was that it was a sow operation and that the animals were sick enough that they were aborting their litters. And in the studying of the disease in those sows it appeared to be a novel disease outbreak, and so that was of great concern.

O'HALLORAN: What sort of disease?

OKUN: Something that was a flu outbreak that did not meet the characteristics of a normal swine flu disease.

O'HALLORAN: So basically you discovered a swine flu outbreak?

OKUN: Yes.

O'HALLORAN: It was not just any outbreak, but probably the most significant swine flu in America for more than 60 years. Because for most of the last century there had been just one main flu virus in America's pigs, which had remained fairly stable. And that was why, in 1998, North Carolina's agriculture department had summoned urgent help from national experts to investigate the new flu virus that had broken out in pigs.

ACTUALITY IN LABS

MAN: We are now heading into the laboratory where we originally grew the virus that was documented in swine farms in this country in August 1998. If you see here, we have inoculated eggs, we actually used ...

O'HALLORAN: At the state's main veterinary laboratory, virologist Dr Gene Erickson, insists there was no attempt to cover up the outbreak or keep it secret. He says even he and his team were in the dark for some weeks until the novel virus was mapped out by painstaking laboratory work.

ERICKSON: We had swine influenza virus in this country which we had never seen before, which means all of the pigs were susceptible, because they had no previous immunity, and that means it swept through the pig industry very quickly.

O'HALLORAN: How did the flu virus at that time, in 1998, spread elsewhere in the United States?

ERICKSON: In contaminated equipment, contaminated footwear, contaminated hauling vehicles - the trucks we use to haul the pigs. The virus was transmitted along the pig transportation routes, so it was a very rapid method for movement of the virus. And the virus then moved from North Carolina. The following year they began finding the virus in pig farms throughout the country, because it spread very quickly and efficiently.

O'HALLORAN: But on its pathway through the States, the virus appeared to mutate and become a so-called "triple re-assortant H1N1" virus, with components of swine, human and bird flu. It was the first time such a triple virus had been identified in America. And within a few years, one leading American virologist, Dr Richard Webby, was arguing that pigs in the USA were, in his words, "an increasingly important reservoir of viruses with human pandemic potential." And this year it's been claimed that the virus that erupted in Mexico is 75% similar to the swine flu virus which swept through pig herds in America in 98. That infection was a critical event, says one of Britain's top experts, Dr Ian Brown, of the Government's Veterinary Laboratory Agency. And he backs the view that the current virus threatening a human pandemic is closely linked to it.

BROWN: I don't think any scientist would dispute that this triple re-assortant, which we know to be circulating in pigs in North America, has a role in the origin of this strain.

O'HALLORAN: It's also been claimed that about three-quarters of this virus is more or less identical with the virus involved in the major outbreak of swine flu among pigs in 1998/99. Is that right, in your view?

BROWN: Yeah, that's correct, there's a there's a good similarity, hence the basis for calling it swine flu. That was a pivotal turning point in 98, was when they first saw the appearance of these so-called triple re-assortants, which have continued to circulate in American pigs since, but we should stress that also there are two components of this virus that appear to come from Eurasian strains, and that's where the puzzle gets quite complex.

O'HALLORAN: One leading American expert says the US pig population are an increasingly important reservoir of viruses with human pandemic potential. Do you agree with that?

BROWN: I would agree that they're an important reservoir for influenza viruses. Whether they present increased threat pandemic potential is, I think, as yet unproven.

O'HALLORAN: This all raises the question of whether virologists and doctors working in human health paid enough attention to the novel swine flu virus in pigs after it broke out in 1998. A question I put to the Government's Chief Medical Officer, Dr Liam Donaldson. Do you think human health experts should have been focusing more on this possible source of danger for humans, swine flu in pigs?

DONALDSON: Everybody was focussed on bird flu, avian flu, and all experts are aware that a number of animal viruses can mix with human flu virus and cause a new strain of flu. It was just really a question of trying to anticipate that that was going to happen in general terms. I think if there had been an awareness of a particular risk arising from a particular flu strain, then it might have been possible to do something to contain that.

O'HALLORAN: Do you think the known linkage now with swine flu in pigs does prompt the thought of possibly more research in that area?

DONALDSON: I think so, and the whole field of surveillance of animal infections - not just flu, but more widely than that needs to be strengthened. There are something like 400 diseases that can transmit from animals to people, and a lot of attention, I think, being given now to try and provide surveillance systems that detect animal infections as easily as we're able to do so for humans.

O'HALLORAN: And some in the States are very suspicious about the role of intensive farming of pigs and whether that could amplify the transmission of viruses?

DONALDSON: Well, all of those factors do make animals more susceptible to infection, so those are all things that need to be taken account of as we look to the future.

O'HALLORAN: Even so, back in America the National Pork Council maintains there is a lack of evidence that industrial pig farming was in any way the cause of the '98 flu outbreak in pigs. So far in the USA, more than two dozen people have died of the current swine flu outbreak, and the number of confirmed cases has gone over 13,000. However, public health officials have warned that the true number of cases could be up to ten times greater. Troubling references have been made to the 1918 Spanish flu, thought to have killed up to 50 million people worldwide, because it also started with a limited wave of illness in the spring and summer. So all over the country, hospitals have been gearing up to face a possible deluge of cases in a few months time. And nowhere more so than in North Carolina, where a new swine flu virus first broke out in pigs in 1998.

ACTUALITY IN CHAPEL HILL HOSPITAL

O'HALLORAN: I'm in the lobby of the University of North Carolina Hospitals at Chapel Hill near the state capital, where in the last few weeks a disaster plan has swung into action to combat the threat posed by swine flu or the H1N1 flu virus. Hundreds of staff have been given extra training. Additional medical supplies have been ordered and special treatment areas earmarked. Posters have gone up warning anyone with flu-like symptoms entering the hospitals that immediate precautions must be taken.

ACTUALITY IN INFECTION UNIT

WEBER: This is an extension to the emergency department that adds 21 additional beds for the novel H1N1.

O'HALLORAN: So in a big epidemic, with thousands of cases in each state, this could become a sort of flu unit?

WEBER: It could indeed.

O'HALLORAN: Dr David Weber is the medical director in charge of infection control. He says that in this state, confirmed cases have been few and far between. But he warns that because this isn't the normal flu season, things could get far more serious later in the year.

WEBER: At this point, based on what we know, this appears to be a new strain and people only have limited immunity, certainly younger individuals. Nevertheless it appears, in terms of the number who are hospitalised or who are dying, it appears to be of similar virulence to a seasonal flu, but we do have to be prepared that it could change and become a more serious illness.

O'HALLORAN: So what steps did you really start taking at a practical level here?

WEBER: We obviously purchased additional anti-virals. We received our stockpiles of drugs, so we have been very involved obviously in the response. In addition, we had an extension to our emergency department that had 21 extra beds, eight beds of which are designed to handle highly communicable disease patients. This virus generally circulates more in the winter. I think we'll get some clues for us in the northern hemisphere by what happens in the southern hemisphere, where they're just sort of beginning their flu season, but I think in the fall it's likely this virus will return. We do need to be prepared for large numbers of hospitalisations, and it's certainly worthwhile to develop a vaccine.

O'HALLORAN: Half an hour away, in the state capital, Raleigh, state officials are working hard to meet the challenge of a pandemic. And Dr Julie Casani, Director of Public Health Preparedness, is already wondering if public services will be able to cope in the autumn.

How big and how unusual has this public health alert been for you really?

CASANI: Well, it was huge. First of all, when it was announced that there was a nationally declared public health emergency, I think that got our blood going pretty quickly. It's the first time really in the history of the United States that a public health emergency has been declared at the federal level, so we knew it was pretty serious.

O'HALLORAN: So, in preparing for the autumn and the winter, what is the worst sort of scenario you are able to plan for at the moment?

CASANI: The worst case scenario is a higher case fatality rate upwards of 2%, so 2 out of 100 people dying or more.

O'HALLORAN: And what are the concerns about the age groups that might be worst affected?

CASANI: With seasonal influenza the people who are usually most affected are the very young and the very old. The concern also would be that not only would those age groups be affected, but also that mid age group of people from 20 to 40 would also be very sick. So the other concern would be that worst flu that could come back would require more hospitalisations and tax the healthcare system.

O'HALLORAN: That would really put intensive care units in this country under huge pressure?

CASANI: Correct. And we know that there are not enough hospital beds as well as not enough ventilators for people who could require them if there was respiratory failure. I think the potential exists that we will run out of resources.

O'HALLORAN: In Britain, the numbers of people contracting the new flu virus are still rising, but far fewer have been affected per head of population than in America. The Department of Health says it's working to curb the spread of the disease. But it continues to warn against complacency and to prepare for a possible global pandemic. In that event the Chief Medical Officer, Dr Liam Donaldson, says he hopes the NHS will cope. But he says he expects much greater pressure on the health service in the autumn and winter. What is the worst we are planning for? Would that be millions or tens of millions of people suffering?

DONALDSON: Yes, the worst case scenario really would be half the population affected. That's unusual in flu situations, but we are prepared for any eventuality really and we prepare for the worst, but we hope that the situation will be better than that.

O'HALLORAN: We've heard concerns in America from health officials about whether their resources could cope. Some are not at all confident about that. How confident are you here in Britain?

DONALDSON: Americans don't have a centralised health service like we do so they don't really have any mechanism to plan their health services. We do, and we've been planning for this for five years now, and one of the key elements of the strategy is to try and keep pressure off the National Health Service for those patients who really need it, who have serious complications.

O'HALLORAN: But if we had millions of people ill in the autumn and winter – and they certainly expect millions in the United States - would we not run short really of beds, ventilators and so on?

DONALDSON: Well, I think they'd be under great pressure, but I hope we won't be into deep trouble with this pandemic. Our plans have been tried and tested, and I'm pretty sure the system will be stretched at times, but we have a lot of planning behind us to be able to cope with a situation like this, so I don't see us slipping very easily into deep trouble, and I hope that the NHS will be very very resilient, even if we have large numbers of cases.

O'HALLORAN: The sudden mutation of viruses, and large areas of ignorance about past pandemics, combine to mean it's almost anyone's guess whether the coming flu season will be little worse than normal or a great deal more severe. And the exact role of intensive farming operations in the chain of causation of a possible pandemic clearly needs much more investigation. What public health chiefs, virologists and doctors are all agreed on with flu is to expect the unexpected. But despite that dictum, it seems that, to many human health experts, swine flu came like a bolt from the blue, even though there'd been some clear warnings of danger in the last few years from some virologists who had focussed - rightly as it turns out - on the risks posed by disease in pigs.

SIGNATURE TUNE