Care and Killing: Tensions in Veterinary Practice¹

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This photograph is one of a series by photographer Chris Chapman which witnesses the culling of animals in Devon during the UK’s foot and mouth epidemic in the spring of 2001. The whole series, plus a commentary and poems by James Crowden, are assembled in a remarkable document, Silence at Ramscliffe, which witnesses that foot and mouth slaughter at Ramscliffe Farm, Beaford in North Devon. Ramscliffe was a smallish dairy farm, run by Philip Lake with help from his father, Percy, and his mother Roma. 216 cattle and 22 sheep were slaughtered on 6th April 2001. None had the disease themselves, but it had appeared on Lake’s cousin’s adjacent farm where the stock had been slaughtered. Official policy, clear in theory if not in practice, was that animals on ‘contiguous premises’ should be culled in order to prevent the spread of the disease. This is why slaughter came to Ramscliffe.

Chris Chapman tells us that there were four people in the team: a slaughterman from Launceston; an AI man from Essex; a young man, just out of training from somewhere ‘up country’; and a vet, Robert Kilby, from East Devon. Chapman took Kilby on one side shortly after the latter arrived and explained that he wasn’t a hired farmhand but a photographer. Kilby was taken aback:

‘There was a pause and then without looking up he snapped at me. ‘OK, you can stay, but I want you in white overalls and that camera wrapped in a plastic bag.’ I felt a flush of relief followed by an awkward feeling of joy.’

Chapman describes in words and photographs the killing of the animals at Ramscliffe. First the milking cows. They were driven into the yard in front of the milking parlour, and then inside and into the stalls. He notes that they were confused, not used to this break in routine. Then they were sedated and ‘gently ushered out’ one by one and guided to the empty silage clamp. The

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2 Chapman had been commissioned by Beaford Arts and the Devon County Council to document foot and mouth in Devon.
3 BBC Online Devon (2002).
4 Foot and Mouth Disease 2001: Lessons to be Learned Inquiry (2002).
5 Chapman (2005, 44).
6 Chapman (2005, 44)
floor was wet with a mixture of rainwater and slurry, and Lake brought straw for them to lie on. Once they were gathered together the slaughter man killed each animal with a captive bolt gun. Then the vet and the AI man used the pithing rod to be sure that each animal was dead, pushing it through the hole in the skull and stirring its brains around. The vet confirmed each death, and the carcasses were marked with blue spray paint. Later it was the turn of the store cattle, and the heifers in-calf. And then, finally, the calves. Chapman’s photos of the latter first show Kilby preparing the sedative for the calves. Then we see three or four calves peering through the barrier in the calf shed. They look alert, well. Then comes the photo above. Robert Kilby is at the same gate. One of the calves is suckling on his finger.

“How do I tell a new born calf
That it is about to be shot and burned?”

asks poet James Crowden on the page facing the photograph. Then the sequence of photos shows us a distant view of the vet and two other members of the team sedating the calves, and the four members of the team moving the calves to be slaughtered. And in the final picture in the sequence, Kilby and the AI man are shown carrying the last calf to be slaughtered.

‘I watched,’ writes Chapman, ‘as … [the calves] were led across the yard, the last one having to be carried. I had seen enough. I couldn’t photograph them being shot. I wandered about the farm in a daze.’

I experience the photographs as an extraordinarily powerful document. They witness an important component in the devastation wreaked by foot and mouth as it visited 2000-plus premises in 2001. There is the slaughter itself: dairy cows turned into carcasses. And then there are the people. So in one photograph we see the farmer, Lake, slipping away into the farmhouse. We’ve already learned ‘that he would help move the cattle but he didn’t want to watch anything being killed.’ We sense, possibly wrongly, that Kilby, the vet is also protecting himself. Chapman:

‘I tried to strike up a conversation [with him] about the merits of the contiguous cull but his brow furrowed. ‘You have to look at the bigger picture’ was all he could offer. He was in work mode now and the job in hand required all his concentration.’

How to handle a document of the kind created by Chapman? The issues and the emotions that it raises were clearly problematic. There is a risk of voyeurism. Crowden catches this in another poem:

‘Vietnam in North Devon and Cumbria,
Hedgerows rank with inquisitive film crews
Relaying the drama as if it was Beirut,
Jerusalem, the West Bank.

In England’s green and pleasant land,
Digital images broadcast every night

Chapman (2005, 52).
into the sofa-safe soft plush depths Of countless suburban sitting rooms."

Earlier Chapman finds himself next to a national press photographer and decides that peering through hedges with telephoto lenses is not what he wants to be doing. He ought, he thinks, to work in a way that records the horrors much more intimately. Ian Mercer, the author of the Devon County Council report on the outbreak, observes that emotions are difficult to write down but nonetheless real. However, in this piece I will sidestep the politics and normativities of voyeurism and emotion by attending to the materialised and embodied complexities of veterinary care in the slaughter of 2001. I return, then, to the photograph of Robert Kilby and the calf because I think that it condenses many of those embodied complexities.

2. The Commentary of a Vet

I ask one vet I’m interviewing, I’ll call him Peter, what he thinks or sees when he looks at this photo. He knows it well, the photo. He takes the book, Silence at Ramscliffe down from his shelf and we look at it together. Here are my notes. They aren’t quite verbatim but he speaks slowly, pausing as I hurriedly scribble:

‘I see the vet interacting with the animals. I see him talking to the calf. His lips are pursed. I guess he is assessing its overall behaviour, he is checking the calves over. He sees that they are fit and healthy, that they are associating with one another, and the state of the bedding, he is looking at that too. He does all this, while knowing that within a few minutes they will be shot. This brings difficult emotions. He is thinking about the loss of life. He is thinking about protecting other farms. He is thinking about doing a job to prevent disease again. This animal will not live long. But he wants to make sure that it has a peaceful life, and as peaceful as possible an end. He wants to make sure that it will be sedated, and quickly killed.

The danger, in this kind of situation, of being involved in slaughter, is you get inured to it. You get used to it. But you cannot afford to become inured to it.

And then you are thinking about the pain this will cause the farmer, and the staff. He may be worrying for their sanity, wondering how they are going to go through it. And, if it were me, I would be worrying about my own sanity. Especially if I am finding it difficult to accept the policy…..

And then, a sense of sadness.’

3. Objects of Care

I listen to this man, an experienced mid-career vet who has spent most of his working life in agricultural practice, and I sense his pain as he talks. Foot and mouth was not something that most farmers or vets wanted to live through, and six years on they have not forgotten it. (The small Surrey recurrence of the disease in August 2007 in the UK brought back many terrible memories).

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13 Interview with vet, 7th March 2007. All the quotations from Peter are from this interview.
Then there’s something else happening too, for like many and perhaps most field vets and farmers, Peter also thinks that the policy of contiguous slaughter was wrong. So let me tease out some of the different aspects or objects of caring that go into what he says, and into what Chapman tells us in words and pictures about the slaughter at Ramscliffe Farm.

3a. Caring for the Animal

First, and most obviously, there is care for the calf itself.

Is it in distress? Is it hungry? Does it sense that something is wrong, even though the team has been careful to kill the animals some distance away? At any rate, it wants to suckle, and Kilby lets it do so on his finger. He talks to it too. Purses his lips, perhaps mimicking its actions. In this set of bodily gestures, in this interaction, we might say that several of the ‘five freedoms’ for farm animals are being done: for instance, the freedom to express normal behaviour, and freedom from fear and distress. But there’s more too.

Peter also talks of the ‘trained eye’ of the vet. I’ve asked him how he knows whether an animal is in good condition when he goes to a farm. What it is that he sees. In response he describes how he looks for signs of ill health – the state of the feet, lameness, the condition of the animal’s coat, whether it is alert or not, whether it is grazing with others. You also, he adds, need to lay hands on the animal. Then he’s talked about how the stockman interacts with the animals in his care. Does he relate with them quietly and confidently? Does he or she reveal a gentle confidence? These are good signs. Or does he shout at them? This is less good. Then he’s talked about the state of the bedding, about whether the animals are interacting with one another. And he likes what he can see in the photos of Ramscliffe. It looks as if the bedding is good and the animals are associating with one another.

And yet the calf will shortly be killed. This isn’t cruelty, which is what a sentimental urban world might imagine. For caring for the calf is also, and crucially, a matter of a good death. Peter:

‘It is part of the responsibility of the vet to ensure that [farm animals] lead as good a life as possible, but then to give them a good death at the end of that life. ... If there is slaughtering, this should be humane, done in a respectful manner. And it is important that the animal should be in a fit state for slaughter.’

Slaughter in foot and mouth was dramatic, traumatic, and unusual because it was conducted en-masse, on the farm. But stock-rearing is about slaughter anyway. So if the team at Ramscliffe is doing its job well then the animals will die a ‘good death’. One that is (an interesting term) ‘humane’. And we’ve seen how this is done. Encouraged first into the parlour with extra feed. Sedated. Coaxed or carried to the place of slaughter. Killed, and pithed. Of course this makes it all sound rather easy if a bit grisly. As we write about it we’re glossing the messy materialities and embodiments, and most of the complexities and specificities. Chapman:

‘As the clamp filled with sedated cows I was shocked to see one cow walk over to another lying motionless on the floor. She sniffed for recognition,

\[14\] Farm Animal Welfare Council (2007).
staring at the body as if in disbelief. It was chillingly human. Another came in and did exactly the same and they both stood there rooted to the spot.\textsuperscript{15}

Writing catches something and simultaneously loses almost everything. This is what it does as it moves away from the farm. But what the team is attempting, very seriously and very professionally, is to achieve a good death: humane and respectful. Care for the animal in life, and care for the animal in the process of killing. This is a first part of caring for the vet.

\textbf{3b. Caring for the Farmer}

But then there are people who work on the farm including the farmer. Again the practical is intertwined with the emotional or the ‘personal’. Peter:

‘Veterinary practices have their business focus, but there is also a pastoral side. If you forget about the pastoral side then you lose the trust and loyalty of clients.’

At Ramscliffe it is most unlikely that the vet has any business connection with the farmer: so far as we know they have never met. In normal times the State Veterinary Service sends a vet to each farm every so often to check the welfare of the animals and renew (or occasionally not) the licence to hold stock. This is a stressful and serious business for the farmer. First it is time-consuming and therefore costly\textsuperscript{16}. Second, the farm may fail the inspection: in extremis a state vet can put a farmer out of business. In this volume Vicky Singleton details some of the increasing strains for livestock holders in the UK as stock records and tags are checked in addition to the welfare of the animals\textsuperscript{17}. Indeed the Ramscliffe farmer, Lake, has an inspection-related panic before the slaughter team arrives and rushes off to clear the slurry tank\textsuperscript{18}.

But if the state vet is caring for the welfare of the stock, and as a part of this, has power over the farmer, the latter is often also moderated by care and concern. First, the vets creatively adapt the rules. For instance, the state vet responsible for the pig finishing unit, Burnside Farm, where the foot and mouth epidemic started, reports that when he made his twice-yearly visit in the summer of 2000 he discovered that the welfare of the pigs was at serious risk. Barriers between the pens had been broken down by large boars, there was unregulated sexual activity, there were pregnant sows, farrowing, fighting between boars, slurry was overflowing, and two dead sows were located in pens alongside the living.

‘I rang [the pig farmer] and told him I was shocked and disgusted by what I had seen . . . . I told him that . . . . I was going to pretend that morning’s visit hadn’t happened and that I would return to the farm early the following week, when I expected to see all problems resolved.’\textsuperscript{19}

\textsuperscript{15} Chapman (2005, 52)
\textsuperscript{16} The costs of monitoring and inspection are a continual concern for the farming industry, and there is a continual tussle around the issue. For an example in the context of animal welfare certification see Keeling (2007, 26).
\textsuperscript{17} Singleton (2007).
\textsuperscript{18} Chapman (2005, 42).
\textsuperscript{19} Dring (2001, 7).
Here he tempered justice with mercy. The people in question were not the best farmers in the world, and they themselves were bending various rules – as it turned out with consequences that were to be disastrous. But they were already in serious trouble anyway because the market was depressed, and they couldn’t sell their pigs for a decent price (hence the size of the boars). So he gave them one last chance.

Returning to Ramscliffe, for Philip Lake and his parents the slaughter is dreadfully painful. I’ve already quoted Peter who suggests that Kilby may be ‘.. be worrying for their sanity, wondering how they are going to go through it.’ Peter goes on to describe how he himself identified foot and mouth on one farm:

‘He had been called because the farmer suspected hypo-magnesium, this is lack of magnesium and causes what farmers call the staggers. He reported [the fact that the problem was really foot and mouth] to the farmer, who didn’t believe it. ‘Rubbish’ [said the farmer]. ‘Sorry,’ .. said [the vet] ‘but I think it’s foot and mouth’. The diagnosis was confirmed by a visit from the State Veterinary Service. Then he talked about what would happen, and they made arrangements to get the children off the farm. ‘It was terribly traumatic. The loss of the herd and the grief of the family had a considerable effect.’

This is a story that repeated itself hundreds of times up and down the country in 2001. And though there were complaints of incompetent and careless slaughtering teams, such stories are far outnumbered by the compliments about a horrible and difficult job sensitively undertaken. Peter reported that when he saw them at work the slaughtermen were ‘efficient and caring’, and the official ‘Lessons to be Learned’ report published after the epidemic observes that:

‘in the majority of cases an unpleasant task was conducted effectively, often in very difficult conditions. Many farmers praised the manner in which the slaughtermen did their job. One submission said ‘there were Government inadequacies in every area bar slaughter’.

We move, then, beyond the caring by the vets as individuals to the caring practised by the team as a whole. Caring for the herd in the killing was also to do with caring for the farmers. For trying to preserve their sanity.

3c. Caring for the Self

And then also important is the care of the self. I’ve already quoted Peter on this. Peter Frost-Pennington, a poet and temporary state veterinary officer in 2001, writes:

‘This is not what I trained for:
I hope familiarity will never make me immune from the trauma of killing
But I do hope – for the animals’ sake – to be good at it.’

There are two dangers: on the one hand to be caught up and immobilised by the pain; but then, on the other, there is another kind of horror. What kind of

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20 Foot and Mouth Disease 2001: Lessons to be Learned Inquiry (2002, 76).
21 Frost- Pennington (2001, 8)
person would one become if one became used to killing? Care of the self, then is a double move. First it has to do with protecting the capacity, the propensity, to experience the possible suffering of the animals to be killed. One would not want be the kind of person who was indifferent to killing, who didn’t care that this caused suffering. And then, the second move, the identification with the task at hand, and especially the animal, needs to be moderated. Care, here, is about responding, but not responding too much. It is about being there, about sensitivity, and yet it is also about distance. It is precisely about self-protection.

Learning how to balance empathy and distance is part of a professional training. Caring for the animal and caring for the self go together. It is set of practices for retaining sanity. We don’t know what Robert Kilby is thinking. However, the way he acts is consistent with this because he doesn’t want to talk about the contiguous cull with Chapman. Indeed, he doesn’t really want to engage with him much at all. This is not a moment for talk. He is in work mode. I’m guessing that the need for concentration was partly practical, to do with doing the task well. But I’m guessing that it was also defensive: limiting his self-exposure to the loss of life and livelihood. Care for the animals, care for the farmer, and care for the self, here at least it seems that the three went together.

3d. Caring for the Bigger Picture

But then there are larger units too. As Kilby puts it tersely in his response to Chapman, ‘You have to look at the bigger picture.’ Peter spells the logic out. ‘He is thinking about protecting other farms. He is thinking about doing a job to prevent disease again.’ But this unpacks itself in various ways: there are different versions of the bigger picture.

First, for instance, there is the disease and the animals around the country. Poet-vet Frost-Pennington:

‘But don’t get me wrong
I have seen plenty of this plague
And it is no common cold.
The animals suffer horribly, as the skin of their tongues peels off
And their feet fall apart.
We must try to kill them quick and clean,
As soon as it appears in a herd or flock.’

He’s talking of animal suffering. It is the vet’s duty of care to minimise the individual, but also the collective suffering of animals – which means eradicating the virus from the UK.

Then, second, there are human groups in a variety of shapes and sizes. Killing may care for the neighbours, for a version of locality. Chapman describes the argy-bargy between a Devon farm and the Ministry of Agriculture, Food and Fisheries, MAFF, through a series of visits and phone calls.

22 The care of the self with respect to moral worth, goes back in the context of animals at least as far as the early modern period, and was arguably separate from any idea of moral or ethical worth of animals themselves. For this argument see Fudge (2006).
calls. The farm, untouched by foot and mouth despite the presence of the disease on nearby holdings, was trying to save its livestock:

‘One insensitive MAFF official even had the audacity to ask the question: ‘OK, so we let your animals live. How will you feel if FMD then spreads to the rest of Dartmoor.’”

You can see the neighbours, or at least you can go and visit them. But there are more abstract or at least geographically-distributed versions of the bigger picture. So, for instance foot and mouth was damaging to the meat trade and to the national economy for a mix of social and biological reasons. Biologically, the disease reduces the productivity of animals as they lose weight and produce less milk. It can also be catastrophic in the South where it is often endemic. Here is an FAO animal health officer:

‘Three weeks ago, I met a farmer in Bangladesh who owns eight cows. When FMD hit, their milk yield dropped by over 70 per cent in just a couple of days. Last year, when FMD struck, four out of his eight cows aborted. Of the four calves that were born, three died.”

Many, including Peter, argue that it should be eradicated in the South. So the collective here is biological but also geographical, economic and human. It is both abstract— it isn’t there at Ramscliffe to be seen or visited – and made real. It matters. And the argument applies to that abstraction, the UK. This is an economic actor too. With foot and mouth disease the UK cannot export meat or live animals to its most profitable overseas markets. So here we have a pressing reason for eradicating it – and indeed eradicating it by slaughter rather than vaccination in combination with slaughter. Under the EU and WTO regime in 2001 export restrictions would be (and were) lifted more quickly if no recourse was made to vaccination.

So this is a fourth object of care. As Kilby works, he also cares for the ‘bigger picture’. Except, here’s the complication, the character of that bigger picture is on the move. Animals and their suffering? Neighbours and their life’s work? The economic interests of the meat trade? The economic well-being of the country as a whole? Or, in some versions, the partisan political interests of a government keen to eradicate the disease and win a general election? It is very easy to imagine ways in which these different ‘bigger pictures’ don’t map onto one another. And this mismatched mapping was very real in 2001. This is why there were so many arguments about the contiguous cull.

4. Choreography and Tinkering

I have listed four objects of care. In 2001 care for the animal, care for the farmer, care for the self, and care for various versions of the collectivity — all of these were present. All were overlapping. But this list is a convenience. In practice the multiplicity is much larger. In the work of Kilby and his team at Ramscliffe and that of the other vets up and down the country, they cared: for the animals in life, the animals at the point of death, and the animals after death; pastorally, for the farmers; for their own sensitivity to slaughter and

26 For discussion of this, see Kitching et al. (2007).
suffering, and the necessary self-protection that goes along with this in order to retain sanity; for an abstract collectivity, the national herd; for the neighbours; perhaps for the meat trade, for the national economy, and on some versions, the political fate of the government. This, then, is care multiple. So how does it work? How is it managed? And when and how does it break down?

The contributors to this volume emphasise that care is best understood as a set of materially heterogeneous practices involving not simply particular kinds of subjectivities, but also instruments, and technologies together with other material elements, texts and inscriptions. Again, the contributions assembled in this volume imply that care may be understood as choreography. This term was introduced to the social studies of science literature by Charis Cussins who used it to draw attention to the intricate organisation that goes into the routines of practice:

‘I use the word ‘choreography’ … as the dominant ontological/political metaphor throughout, to invoke materiality, structural constraint, performativity, discipline, co-dependence of setting and performers, and movement.’

Her particular interest was in the complexities of patient subjectivities in the context of infertility treatment. But the process of veterinary caring is choreographed in analogous ways. It too involves the intricate ordering and distribution of bodies, technologies, architectures, texts, gestures and subjectivities. And the metaphor of choreography also reminds us of the extreme degree of effort that goes into that organisation: what may sometimes appear to be simple from the outside never is in practice.

Crucial to the ordering of choreography, including the choreography of care, is the arrangement and distribution of events and actors in space and time. It is obvious that there are moments when good care requires that particular elements be brought together: the straw and the silage clamp; the fingers of the vet and the calf; the bodies of the cows and the pithing rod. If, as Mol has argued argued, care is an unfolding embodied and material process, then the space-time choreography of these moments of juxtaposition and contact is central to its organisation. Though it is also important to understand that this organisation is more or less local, for the precise structure of contact cannot be predicted. Care depends not so much on a formula as a repertoire that allows situated action.

However, in the present context even more significant for my argument are the separations and distances that are also entailed in care. We have seen the importance of a number of these. There is, for instance, the isolation of the farm from the outside world: no-one is to come onto or to leave the premises while the slaughter is taking place. There is the moment when Lake, the farmer, abandons Kilby’s team to return to his kitchen because he cannot bear to watch the slaughter of his animals. We have Peter’s account of the arrangements to move the children off the farm before the slaughter team

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arrives. There is the physical organisation of the slaughter of the cows: care is taken to ensure that the calves, no doubt already disturbed, are not close by while this takes place. Then, and differently, there is Kilby’s refusal to talk about the contiguous cull with Chapman. All of these are examples of the choreography of separation. And all are crucial to good care.

Why? One answer is that caring take the forms of spatially and temporally segregated events. First this has to be done, then that, and then something else. But another answer is that if it is the case, as I hope I have shown, that veterinary care is care multiple – if multiple objects are simultaneously being cared for—then the coherence, consistency, or compatibility of the practices that care for those objects is chronically uncertain. Indeed, more strongly, it is chronically problematic. Quite simply, caring for a good life and practising a good death do not necessarily go together, not, at any rate, at the same time and the same place. Care of the self and care for the calf may be, and quite likely are, in tension. Somehow or other distance between the two needs to be practised. Care for the individual farmer and care for the national collectivity may, but possibly do not, fit together very well. The choreography of care multiple – and care, I’m hinting, is probably always multiple – necessarily depends on the organisation of separations. Let me insist, too that it necessarily depends on the unfolding of separations. And this is the final piece in the puzzle: for, as I briefly mentioned above, it also follows that such separations cannot be planned and orchestrated beforehand.

Literally read, choreography refers to the writing of dance. More usually the term is used to refer to a space-time set of rules or practices which shape but do not determine the actions of the bodies of the dancers. As we have seen, Cussins extends the term to refer to the complex subjectivities of women undergoing fertility treatment. If we apply this to veterinary care then we need to say that the latter rests upon routines for ordering complex objectivities and subjectivities. Then we need to add that since the objects of care are multiple it depends, in particular, upon routines for separating moments and objects of care and (possibly even more important) the subjectivities that go with them. And then finally we need to add that those routines are also and essentially experimental. They grow out of the routines and repertoires of past practice – but they are themselves also a form of trial and error, involving the creation of new practices for separating and handling tensions between different subjectivities and objectivities.

This, surely, is what Kilby is engaged in when he refuses to talk about the contiguous cull with Chapman. His terse comment is a self-protective improvisation that reflects the need for self care. Again, and surely, this is what he allows to happen when he lets the calf to suckle on his fingers. For this too is an improvisation: it was not built into the rules that define the proper slaughter on farm premises – or indeed the proper care of farm animals. Annemarie Mol talks of the importance of tinkering in medical care. She treats the latter as a set of constantly unfolding and only partially routinised practices for holding together that which does not necessarily hold together. And this is the nature of veterinary care too: it can be understood as an improvised and experimental choreography for holding together and holding apart different and relatively non-coherent versions of care, their objects, and their
subjectivities. It is the art of holding all those versions of care in the air without letting them collapse into collision.

References


Chapman, Chris, and James Crowden (2005), Silence at Ramscliffe: Foot and Mouth in Devon, Oxford: The Bardwell Press.


Kitching, Paul et.al. (2007), 'Global FMD control—Is it an option?' Vaccine, 25, 5660-5664.

