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Cows on the Move: The Im(Material) Politics of Animal Passports and the Risk of Antimicrobial Resistance

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To the memories of Henry Buller, best companion in farm animal adventures, and Bruno Latour, master tracer of the movements of power.

Introduction

The newborn calf is oblivious to Jack's actions and their significance. All she feels is her mother's tongue assiduously licking her clean, removing fluids, membranes and blood, revealing her unique pattern of black splodges. Two feet away, in the dark of night, Jack, whose presence she will soon grow used to, is writing the date and time of her birth on the farm's whiteboard, the first of her movements to be officially recorded. In the morning, after checking on mum and daughter, Jack transfers the whiteboard's information to the farm book, whose stains of blood and muck and bits of hair and hay attest to the messy business of looking after animals. In the transfer, some pieces of information, like time of birth, are left behind, but others are added, namely the last 6 digits of the 12-digit number on the ear tag that Jack must fit within 36 hours of her birth. The first six digits are the holding's registration number, the seventh is a 'check digit', designed to limit input errors when the farm book data are transferred to the online portal of the British Cattle Movement Service (BCMS). The eighth digit is a place holder, changing whenever the births registered at the farm reach 10,000. The

final four are how the newborn will be known to the farm workers: 2356 (Figure 4.1). Within 27 days, Jack must take the book to his office and log into the BCMS to report her birth, quoting the ear tag number. A few days later, 2356 will have her very own cow passport.

Without the passport, ear tags and a movement licence, 2356 cannot move through the circulatory system of UK dairy and cattle farming that connects farms to markets, slaughterhouses and agricultural shows. But the passport and the online tracking system trace far more than 2356's movements, and this chapter shows how animal mobilities, like those of 2356, are woven together with policy mobilities. I look at two policies that seek to control the movement of animals and what their bodies give movement to, such as disease and bacteria, to reveal the materiality and multiplicity of policy mobilities. After a brief overview of the interconnections between animal and policy mobility studies, I discuss the history of the UK/European Union (EU) development of the cow passport. I demonstrate how the passport consolidates and sets in motion a wide range of policies – food safety, public health and market operationality – all of which can be threatened by animal diseases. The cow passport makes these not only 'ontologically accessible' (Atkins and Robinson, 2013, p 1377) but also politically accessible. That is, it makes them governable. It fastens together the complex assemblage of material objects, documents, regulations, organizations, veterinary inspectors, administrators and others on which policies depend and through which they, quite literally, materialize into realities. The chapter then turns to an example of a global policy challenge, the case of antimicrobial resistance (AMR). As a genetic *process*, AMR is more ontologically slippery than disease, and this makes tracing and controlling its movement politically and ontologically challenging: chasing the risk of resistance is not the same as chasing resistant bacteria. Nonetheless, based on the 2016 O'Neill report *Tackling Drug-Resistant Infections Globally*, the UK has developed a policy for its control that is similarly dependent on materiality. As I examine the potential for the UK approach to travel to Colombia, I expose the challenges that context poses to the materialization of policies inspired by the O'Neill report. I also interrogate the report's claims that for these policies to be mobilized successfully in low- and middle-income countries (LMICs), the latter will need time. I end by asking what studies in policy mobilities might learn from taking time seriously (Adam, 2000).

Turns and intersections: animals, policies and mobilities

Building both on Lévi-Strauss' proposition that 'animals are good to think'[2] (1963, p 89) and on Derrida's musing as he stands naked in front of his cat 'before whom I am so numbed with shame' (Derrida and Wills,

Figure 4.1: Calf 2356

Source: Photograph by María Paula Escobar Tello

2002, p 379), the 'animal turn' (Buller, 2013) in social studies has mirrored Derrida's question back onto ourselves. As it trickles through literary criticism, anthropology, sociology, history and, more recently, education, this turn examines what our representations of animals tell us about how we see ourselves as fundamentally different from them. It asks how these othering manoeuvres underlie our treatment of animals and what alternative ethics are made possible by alternative subjectifications of them (Armstrong, 2008; Haraway, 2008; Hinchliffe, 2008; Srinavasan, 2013; Drake, 2015). It has dismantled the binary opposition of humans and animals by suggesting different relational, hybrid and de-essentialized ontologies: more than human, post human (not in a chronological sense but in the sense of beyond; Wolfe, 2011) and humanimal.

Noticing a lingering anthropocentrism in some of this work, a stream within animal studies has sought to 'bring[ing] the animals back in' (Wolch and Emel, 1995, p 636) to show how animal bodies and behaviours have mattered – in the sense of having relevance and in the difference that their specific characteristics and physiologies make to the symbolic and physical places they occupy in our shared histories. This mattering/making a difference demands recognition of animals' animality – rather than semi-humanization – to make them subjects of ethical and legal frameworks. It also demands recognition of their agency and active participation in the

(un)making of worlds. This attention to animal places, to our disciplining and ordering of their bodies into specific locations and to the spaces their bodies trace as they move, has been the focus of animal geographies (Wolch and Emel, 1998; Buller, 2013; Hovorka, 2019; Philo and Wilbert, 2000). Attending to the material and organic vitalities of animal bodies and how animals disrupt human orderings of space (becoming feral, pest or invasive) has allowed an embodied understanding of their agency, its limits and the challenges it presents to disciplining efforts. It has offered a lens through which to examine animal politics.

In tracing the networks of relations revealed as animals are followed in and out of material and metaphorical places, scholars have highlighted the role that animal bodies, agencies and behaviours have in human politics. For example, in my analysis of the material refurbishment of Trafalgar Square – to turn it into 'a world-class square for a world-class city' – I show how we enrol animals in policies that are designed to control which humans can access certain public spaces (Escobar, 2014). The removal of the pigeon feed stall, the introduction of a by-law to stop people from feeding the birds and the physical refurbishment of the square, including the inauguration of a cafe, means experiencing Trafalgar Square no longer costs 30 pence for a tin of seeds but £2.45 for a cappuccino. It effectively marginalizes the loners, homeless or working-class visitors associated with the stigmatized figure of the pigeon feeder. However, if animals get passively enrolled in our politics, their presence in our cities also speaks of their agency. Their abundance and persistence despite our attempts to control them, and their adaptation to our urban spaces, including begging behaviour to encourage us to feed them, show that their decision to dwell among us is more on their terms than ours. It is their agency that makes pigeons both feral and pest.

Animal and mobilities studies have met before. Scholars have examined, for example, how animals move through 'globalised networks of production and consumption' (Bull, 2011, p 23), how they move through space (McKiernan and Instone, 2016) and through time (Seaman, 2007) and how they become a new entity as they perform movements with humans (Maurstad et al, 2013). More recently, Hodgetts and Lorimer (2020) offer other potential cross-fertilizations between animal and mobility studies and call for research on how mobilities are experienced by the animals themselves. However, I take a different approach in my effort to connect animal and policy mobilities. Understanding policies as assemblages of objects, documents, discourses and bodies (human and/or not), I explore how policies seek to regulate animal mobilities and how the policies that regulate animals are themselves mobile.

Studies in policy mobilities seek to account for the differences between societies where the policies are designed and those where they are implemented. They compare policy journeys across different socioeconomic, cultural, political and institutional geographies and relate them to different

narratives of failure and success (McCann, 2011; Peck and Theodore, 2012; McCann and Ward, 2013; Ward, 2018; Fairbanks, 2019; Lovell, 2019; Malone, 2019). They query the imaginary of fixed, atomized policy components and explore how the assembled elements of policies – technologies, narratives, structures, instruments and institutions – often travel separately and mutate throughout the journey (Fairbanks, 2019). Crucially, they emphasize that policies do not travel in a political vacuum. Above all, policy mobilities studies expose the uneven power relationships along the conveyor belt on which policies move (Ward, 2018).

The field of policy mobilities treats mobility and mutation as imbricated processes: context matters and policies are susceptible to mutation. This emphasis on process requires an engagement with time – Peck and Theodore argue that policy-making processes have accelerated, leading to 'emergent fast-policy regimes' (2015, p 4). Policy mobilities literature has explored the rate at which change happens and the time pressures of policy cycles (Howlett and Goetz, 2014), and more recently it has dissected stages of the policy cycle, from agenda setting and formulation to implementation and evaluation (Lovell et al, 2023). However, to take time seriously is to work with its multiplicity (Griffiths et al, 2013) and think beyond time as clock to consider it as duration and chronology. For Adam (2000), that means thinking about time as context and as multidimensional, to be sensitive to timescapes, or the 'temporal complexity of socio-environmental existence' (Adam, 2000, p 137).

Finally, policy mobilities literature draws heavily on Deleuze and Guattari's (1987) notion of assemblage, as it allows an ontological understanding of policies as a set of heterogeneous elements that work together towards a purpose. In turn, animal studies draw from actor–network theory's relational, heterogenous and flat ontologies, sensitive to the role and agency of material and non-human entities (Law and Singleton, 2014; Drake, 2015; Nimmo, 2019).

It is to assemblage and materiality in policy mobilities that I now turn to show, first, the political role of cows and their passports in the successful deployment of policies to control animal disease in the UK and, second, the mobility challenges that UK policies face as they travel to LMICs in the global effort to control the risk of AMR.

Cattle passports: mobilizing animal, human and market health in the UK

Calf 2356 is a dairy calf. Because she is female and her mum is a good cow (productive, nice temperament, healthy), Jack will rear her as a replacement cow. Other heifers, male calves and cows that are not so 'good' will move across farms, finishing units, markets or the slaughterhouse, depending on the

business model and the financial context of farms. All these movements will be made under the general licence of the Animal Health Act 1981, which stipulates the conditions (keeper registrations, standstill rules, prohibited movements, record-keeping requirements) under which movements can take place. Because his farm is not officially free of bovine tuberculosis, Jack needs to apply for a specific movement licence before moving cows off his farm.

The regulation of cattle movements has a long history in UK governance, which I trace later in big leaps to show how the cow passport effectively materializes policies on public health, animal disease and market operationality. Live cattle imports were banned between 1666 and 1842 'for the encouragement of trade' (Spinage, 2003, p 250), but controls within the country were first instigated because of concerns about disease. Cattle plague, or rinderpest, a viral and highly contagious disease that cattle pass to each other through their breath, arrived at dairies near London in July 1714 (Wilkinson, 1992). Aware that farmers hid infection because once it was known that someone's herd had sick animals, 'none would buy their Milk' (Bates, 1718, p 872), the orders were to stop all movement of cows from herds with sick animals, to slaughter and burn (later bury at a minimum depth of eight feet) all sick cows and to stop all contact between keepers of sick cows and those whose herds had no cases. Farmers received 40 shillings for each slaughtered animal, although compensation levels and criteria changed as the disease spread. These controls were largely successful and used again for a rinderpest outbreak in 1745, when movement certificates were first required, setting a precedent for regulating cow movements.

Working with miasmic and environmental theories of disease, the Public Health Act 1848 and the related acts and statutes later compiled by W.G. Lumley in 1859 as 'The New Sanitary Laws', created physical and cultural distances between humans and animals, and included the regulation of animal movements. The routes through which animals could be driven were regulated to alleviate obstruction to pedestrians and establish distance between the filth and nuisance animals created and the increasingly purified lives of humans. Title XXII of the Town Police Clauses Act 1847, for example, stipulated:

> commissioners may make *orders* for regulating the route by which persons shall drive any cart or carriage, or cattle, or the manner in which they shall drive them, in the neighbourhood of such places of worship, during the hours of divine service on Sunday, Christmas Day, Good Friday or any day appointed for a public *fast* or *thanksgiving*. (Lumley, 1859, p 453, original emphasis)

By the end of the 19th century, dairies and slaughterhouses were being pushed outside city centres (Otter, 2006; Maclachlan, 2007).

Cattle plague returned in 1865. With the British imperial government now committed to free trade, the scientific responses to questions about the plague's origins and manner of spread were interpreted under those economic imperatives (Hall, 1962). One of the key actors was veterinarian John Gamgee, who explained its spread through germ theory and traced its origin to Russia (Erickson, 1961).[3] Gamgee was attacked and ridiculed (Hall, 1962; Fisher, 1993; Romano, 1997), but the Royal Commission tasked with investigating the outbreak and coming up with solutions agreed the disease was contagious – though they found the process of contagion unclear (Romano, 1997). Movements to and from markets and fairs, movements via imports and movements through the railway had all contributed to the spread of the cattle plague, but efforts to limit them were resisted by those whose livelihoods depended on these movements. The choice was between draconian slaughtering, which triggered debates about compensation, and a movements-based approach. Some of the 12 commissioners shared Gamgee's view that there should be a ban on all movements alongside compulsory slaughtering with compensation. Others preferred a system of movement licenses (Hall, 1962). Eventually, the magnitude of animal deaths and monetary losses led to the Cattle Diseases Prevention Act 1866, which set precedents for inspections and enforcement powers, transport conditions and disinfection protocols. A Contagious Diseases (Animals) Act was passed in 1869, and through its subsequent amendments and replacements a formerly localized and 'permissive' approach became increasingly centralized and compulsory (Hunting, 1890).

The market approach to the control of animal diseases continued into the 20th century as the internal UK and European markets took shape and developed instruments to trace and control movements and to set the health and welfare conditions under which movements could take place. The UK's Diseases of Animals Act 1950 required licences to move imported cattle from the 'landing place' (the port where they arrived) to the market. These licenses were expected to move with the animal and an initial form of traceability began to take shape in Article 5, which allowed authorities at markets to request from sellers

> the names and addresses, if known, of the persons to whom he has sold animals and of the numbers of each class sold to each person, and may require the person who applies for a licence authorising the movement of animals from the market to state the name and address, if known, of the person from whom he purchased the animals.

In the Tuberculosis Order 1984, licences were required to move animals, manure and slurry if tuberculosis had been identified at the farm, and keepers were ordered to identify every animal moved to be slaughtered except those

under 14 days old 'in a visible way'. Hence the additional demands made of Jack to have a movement licence each time he moves cattle off his farm.

European regulations often borrow from precedents established in the UK and vice versa. When the European Community began to consolidate its internal market, Council Directive 34/432/ECC of 1964 'on animal health affecting intra-community trade in bovine animals and swine' established the definitions for animals, herds and areas that were to be considered as brucellosis-free, tuberculosis-free or epizootic-free. This was key to the licensing of movements. It established the obligation to identify bovines with earmarks, consolidated disinfection protocols for modes of transport, established veterinary checks at departure and arrival points and set out the need for animals to travel with either a health certificate or a negative test for either disease. The tests themselves were regulated and standardized for animals and for milk. Templates for individual health certificates were included in the Annexes and were differentiated according to the purpose of the movement: production, breeding or slaughter.

By June 1990, the concern had shifted from dealing with the effects of animal disease on intra-community trade to ensuring the 'harmonious operation of the common market' – which implied free movement of animals and no zootechnical or veterinary barriers. Council Directive 90/425/EEC established the need for national identification and registration systems that made animals identifiable and movements traceable through a computerized system to be developed by each EU member state. It also required holdings to be registered and it reiterated the need for health certificates to accompany animal movements. A few months later, the UK's Bovine Animals (Identification, Marking and Breeding Records) Order 1990 stipulated the requirement for animals to have 'distinguishing marks' and 'approved identification' but with no further detail. It did, however, provide a template (Figure 4.2) for recording movements: a five-column table including date of birth, breed, sex, approved identification and approved identification for the dam (the dam is the birth mother, not necessarily the same as the biological mother). Unidentified animals could not be moved.

Two years later, Council Directive 92/102/EEC refined the understanding of 'approved identification' and introduced ear tags like the one assigned to 2356. These must be tamper-proof and easy to read, and there are currently 17 suppliers approved by the Department for Environment, Food and Rural Affairs (2023). The Directive detailed the information that must be included – an alphanumeric code identifying the holding and the individual animal – as well as their physical characteristics. It also required keepers to have a register of all animals, births, deaths and movements – at least as an aggregate – with details of origin, destination and date.

In the UK's Bovine Animals (Records, Identification and Movement) Order 1995, the ear tag, as the material object designed for identification purposes, was more closely integrated with the paperwork for the control

Figure 4.2: Template to record details of each calf born, following The Bovine Animals (Identification, Marking and Breeding) Order 1990

SCHEDULE (Article 9(1))

FORM OF RECORD

BOVINE ANIMALS (IDENTIFICATION, MARKING AND BREEDING RECORDS) ORDER 1990

Name and Address of person keeping the record:

[Particulars of each calf]

Date of Birth	Breed	Sex	Approved Identification	Approved Identification of Dam
[1]	[2]	[3]	[4]	[5]

of movements, but the latter was still a record to be kept at the farm. The new template added columns to the 1990 form to record the ear tag number, the date animals arrived on the farm (by birth or by purchase), when they moved off the farm (by death or by sale), the origin of purchased animals and their destination when they left, including the name and address of the person in charge at either point. The final column recorded the total number of animals moved (see Figure 4.3). In the specific case of calves, market operators were required to demand from sellers – and provide to buyers on request – similar details to those recorded for adult cows; that is, place of origin with details of keeper, ear tag number, and dates and places of previous movements. In contrast to 1950, keepers were now required rather than encouraged to record details, so it became their duty to know them, not just an option. As with the 1990 Order, to further facilitate traceability, keepers needed to retain these records for ten years for farm records and three years for any other holdings. Records at markets had to be kept for six months. How to deal with lost and replacement tags was also stipulated.
One year later, the UK passed the Cattle Passports Order 1996, which stipulated that no movement could take place without a passport (different passports were created for calves and adult cattle). Issued individually, cow passports became the material instrument where animal movements were recorded. The nuance is significant: whereas what was required before was the recording of movements in a template that included a column for the animal's identification, from 1996 the cattle passport and the animal's uniqueness take precedence in the recording of its movements and always accompany the animal. The cattle passport was introduced at EU level in December 1997 with Council Directive 2629, and veterinary and

Figure 4.3: Template to record animal identification and movement details, following The Bovine Animals (Records, Identification and Movement) Order 1995

SCHEDULE 2 Article 5

Form of Record of Bovine Animals

The Bovine Animals
(Records, Identification and Movement) Order 1995

Record of Animals

Name and address of person keeping the record:

.....

To be filled in when applicable		Particulars of each animal filled in for each event			To be filled in when born	To be filled in when tag is lost	To be filled in when animals are moved onto or off holding			
Date of movement onto farm or of birth or of loss of tag	Date of movement off farm or of death	Ear tag number	Breed	Sex	Dam's identification mark	Replacement tag number	Age or date of birth (when known)	Premises from which moved and name and addresses of person from whom delivery taken	Premises to which moved and name and addresses of person taking delivery	Number of animals moved

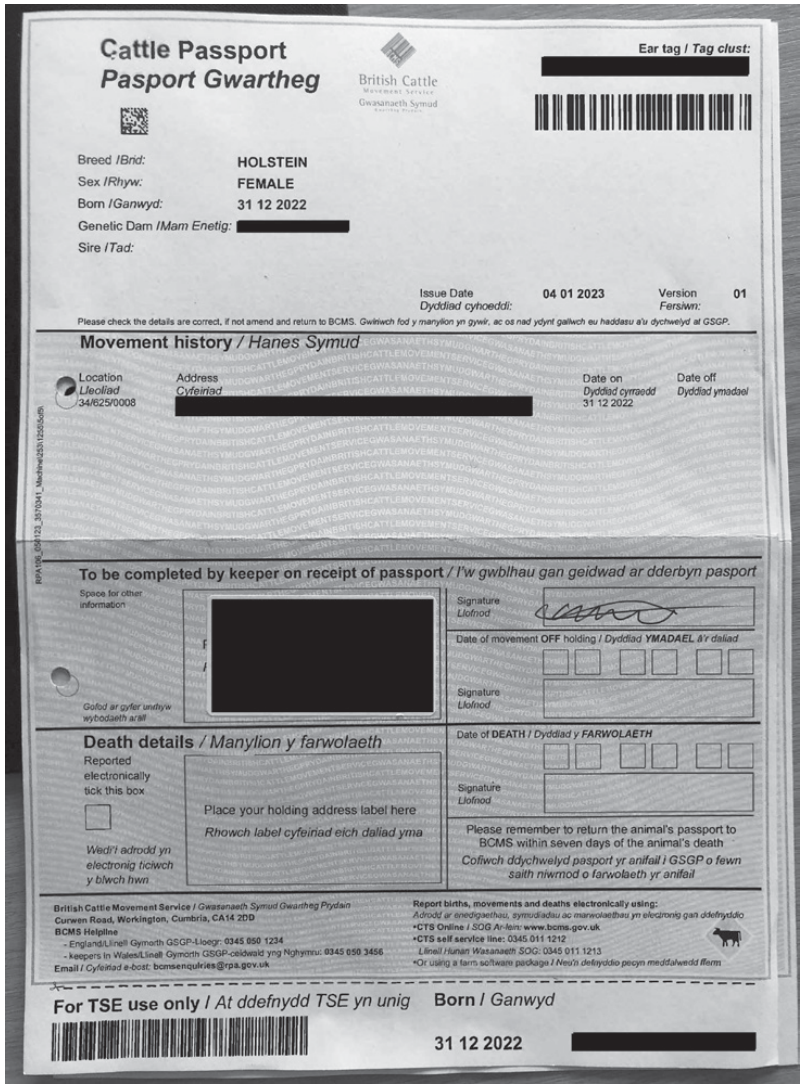
zootechnical checks required to control animal diseases were integrated into the cattle identification and movement control regulations. The passports were to include the same information required by Council Directive 97/12/EC, dealing with the control of animal diseases – which in fact were the same as those required by the Bovine Animals (Records, Identification and Movement) Order 1995. The same information had to be reported, together with details of each movement, in a computerized database operating as a surveillance system, which each member state was expected to introduce.

In the case of the UK, the system is called the Cattle Tracing System (CTS), and this is managed by the BCMS. The BCMS issues the passport, which has had different designs: from a single-sided A4 sheet to booklets with tear-out pages, and now a double-sided A4 sheet (Figure 4.4a and b). Imported cattle do not need a passport in advance, but they do need one once they arrive. The animal's identity data are visually more prominent than its movements, which are all to be recorded on the back of the page as the animals moves off or onto premises. On each end of a movement, passports are checked and identities are confirmed by the relevant person, whether it be market operators, farmers or official veterinary inspectors.

This regulatory history developed to protect public health, control animal disease and harmonize an integrated market. But it is also a process in which a series of human, animal and material objects that establish human–animal distances – from veterinary inspectors to tests, from health certificates to ear tags – have been positioned to obstruct the path of disease and make markets operational. This placing is inherently spatial: the regulations unfold almost as a surface, punctuated by instances and modes of control, through which cow bodies but no diseases may transit. Disease itself is identified through the tests, and veterinary expertise is distributed along farms, slaughterhouses, markets and borders; the absence of disease is reflected first in the health certificate and then in the movement licence. The ear tag ensures that the tests and licences belong to the correct cow body, and the CTS provides rapid access to information and makes any wrongdoing traceable, whether that be human based – fraud cases, such as the horse meat scandal of 2013 – or animal based – when disease escaped control in the foot-and-mouth outbreak of 2007. While cow bodies and tests make disease ontologically accessible, the ear tags, certificates and licences make the control of the movement of disease politically possible. But it is the cow passport, as a material moving object that grants 'mobile subjecthood' (Cresswell, 2014, p 713) to 2356 and her UK kind, that pulls together the assemblage of objects through which food safety (movement licence), public health (ear tag) and market operationality (BCMS and CTS) policies come into being. The system does not guarantee the containment of disease, but it makes it traceable if it is identified.[4]

But efforts to control disease have produced other material and practical networks that include diagnostic tests, laboratories, pharmaceutical companies

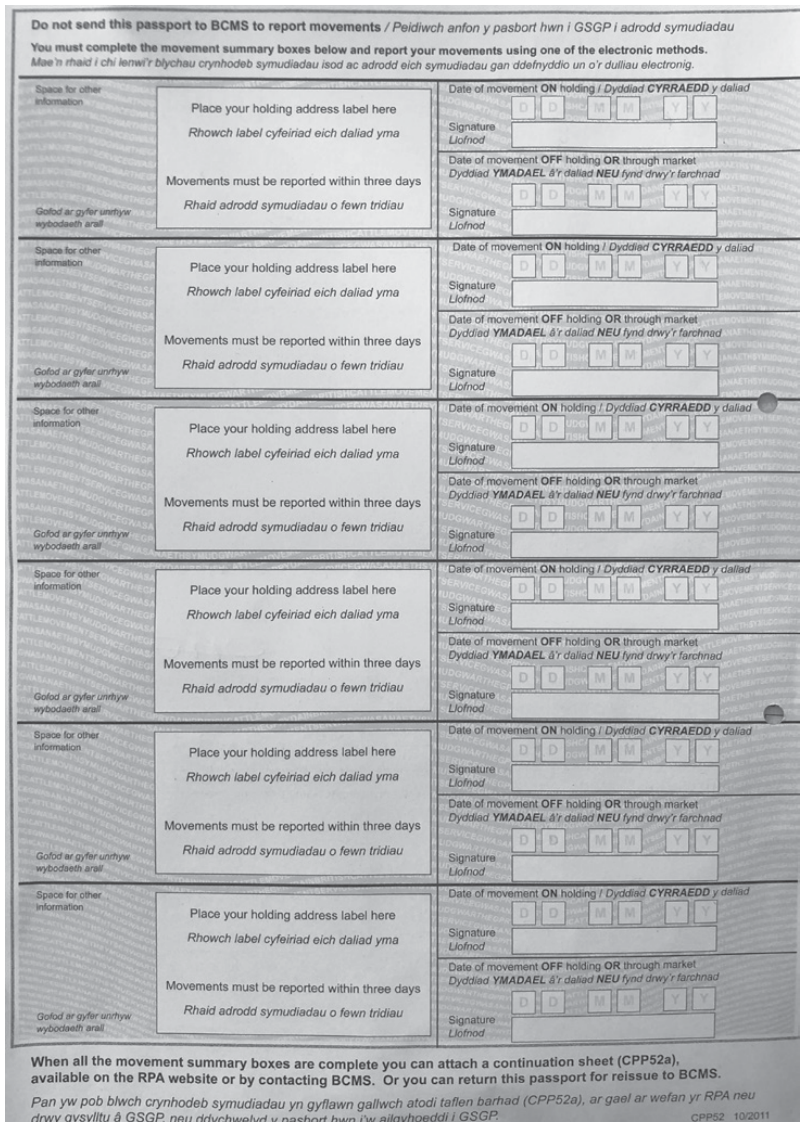
Figure 4.4a and b: Current format and design of a British Cattle Passport



Source: Photograph by María Paula Escobar Tello; form available under Crown Copyright: www.gov.uk/guidance/get-a-cattle-passport

and medicines. Medicine residues must not contaminate milk. Jack is required by law to keep a record of every time he doses 2356 with medication so he and his workers can stop her milk from entering the human food chain (Escobar and Demeritt, 2017). However, the circulation of one type of medicine, antibiotics, has resulted in a new challenge to human and animal health: AMR. I now turn to the material policies designed to contain AMR and to the challenges they face as they travel to LMICs such as Colombia.

Figure 4.4a and b: Current format and design of a British Cattle Passport (continued)



Immaterial and immobile policies: the control of AMR in LMICs

AMR is bacteria's acquired capacity to resist the antibiotics designed to kill them. AMR matters because your attentive body has approximately 3.0×10^3 human cells. Hard as it is to imagine, this number is smaller than

the 3.8×10^3 bacteria cells also living inside you. These bacteria are of three main types: commensal bacteria that do no harm to humans and indeed can help keep us healthy; pathogens, which may or may not lead to symptoms and cause disease; and antimicrobial-resistant bacteria, which have lost sensitivity to antimicrobials, particularly antibiotics. Antibiotics work by entering bacteria cells and attacking 'targets' in different parts of the cell. To defend themselves, bacteria mutate in four different ways: by making a change in the target to make it insensitive to the drug; by acquiring an additional target that is not sensitive to the drug; by developing mechanisms to combat the drug's action; or by making it harder for drugs to enter the bacterial cell at all (Avison, 2005). Thus, AMR is a process of movement and mutation with different pathways and drivers for the mutations that materialize it.

The emergence of resistance is shaped in part by how we use antibiotics in a human health context – with or without a laboratory diagnosis, completing or not the course of treatment. However, some of the pathogenic and resistant bacteria are zoonotic; that is, we share them with animals in a complex flow that means that resistant bacteria can move between animals and humans through food, proximity and the environment. The percentage of global antimicrobial sales that is used in livestock is estimated at 73 per cent (Tiseo et al, 2020). Thus, resistance may also be facilitated by practices in livestock farming, including the use of antibiotics to accelerate growth or to deal with the risk – rather than the presence – of disease, although the direct link between AMR from livestock agriculture and human AMR is a contested issue (Woolhouse et al, 2015; Muloi et al, 2018; Coe et al, 2023). The 'misuse' and 'overuse'[5] of antibiotics may be seen to drive the potential for these mutations to occur, but it is less clear how they relate to specific on-farm practices such as medicating healthy animals to prevent contagion or not following dosage or length of treatment indications.

In the first half of the 1990s, national efforts to monitor AMR began to emerge in Finland (the Finnish Study Group for Antimicrobial Resistance was established in 1991), Denmark (the Danish Integrated Antimicrobial Resistance Monitoring and Research Programme was established in 1995) and the US (the National Antimicrobial Resistance Monitoring System for Enteric Bacteria was established in 1996). At EU level, the main on-farm approach has been to reduce the usage of antibiotics by setting benchmarks and targets. In the UK, the Responsible Use of Medicines in Agriculture Alliance (RUMA) put together a target task force that in 2017 set 40 sector-specific targets to reduce the overall use of antibiotics (calculated as milligrams per kilogramme). These include: reducing their sale; increasing sales of alternative treatments (for instance, the use of vaccines or sealant tubes instead of intramammary tubes for the prevention and treatment of mastitis in dairy cows); training farmers and veterinarians; preventing situations and conditions that lead to the use of antibiotics; and reducing

antibiotics used in human medicine. This understands AMR as a matter of doses of antibiotics, for whose control a complex assemblage of incentives and regulations has been put in place (More, 2020). These assemblages rely too on the materialities of bottles, tubes, records and vaccines.

The global consumption of antibiotics is estimated to grow by 11.5 per cent by 2030. LMICs drive the trend (Tiseo et al, 2020) as increases in income have led to higher demand for food of animal origin (Henchion et al, 2014), in turn increasing the use of antimicrobials (Van Boeckel et al, 2015). As antimicrobials lose their power, our ability to control the diseases that affect humans is increasingly felt to constitute a 'worldwide health threat' and a 'developing global crisis' (WHO, 2012, p iv). This is particularly urgent in the Global South, where health systems can be more fragile. To contain AMR, the World Health Organization (WHO) developed a global action plan (WHO, 2015a) that includes a global surveillance strategy (WHO, 2015b). In 2014, then UK Prime Minister David Cameron commissioned Jim O'Neill to conduct The Review on Antimicrobial Resistance to analyse 'the global problem of rising drug resistance and propose concrete actions to tackle it internationally' (AMR Review, nd). The O'Neill report pushes ten recommendations into the policy spaces of health, food and agricultural authorities around the globe. In anticipating how the policy approaches it outlines for industrialized economies might travel to the 'poorest countries', the report acknowledges that LMICs will need international 'support to train veterinarians, guide development of regulatory frameworks for antibiotics, build laboratory and surveillance capacity, improve farming practices and other similar methods of capacity building' (O'Neill, 2016, p 24). O'Neill also reiterates a point from his previous report *Antimicrobials in Agriculture and the Environment: Reducing Unnecessary Use and Waste* (O'Neill, 2015), emphasizing that LMICs will need more time.

In the context of journeying AMR policies, thinking of time as chronological implies unpacking time frames, temporalities, timings, tempo, duration, sequence and modalities (Adam, 2000). But time is not only chronological: deciding what steps need to be taken in what time frames and sequences is also contextual. How does kairos – the right time for something to happen (Schwanen and Kwan, 2012) – change for different localities? How long do LMICs have to adjust their context to one where policies based on the control of antibiotics' mobilities à la RUMA become feasible? Answering these questions is not a simple matter; it implies an understanding of the reversibility or not of resistance, and of the impact of periods of resistance on human, animal and environmental health as resistance is reversed. To consider the challenges of AMR policy mobilities and the importance of politics and context, I now turn to Colombia, a regional pioneer in AMR regulations.

Colombia is a representative example of LMICs living a 'livestock revolution' (Delgado, 2003). Efforts to deal with AMR in Colombia

predate those of many Global North countries. The Microbiology Group of Colombia's Instituto Nacional de Salud (National Health Institute) was four years ahead of the US and European efforts mentioned earlier; it started monitoring resistance in a series of pathogens in 1987, by which time its legislation to control the presence of antibiotics or other substances in any food or drink product (Law 9, 1979) was already well established. Draconian in character – it punished said presence with product confiscation – Law 9 of 1979 belongs to a wider set of policies designed to protect human and environmental health. Resolution 1326 of 1981 regulates the use of antimicrobial products in domestic animals and Resolution 1966 of 1984 regulates the use of antimicrobial substances as growth promoters or enhancers of food efficiency insofar as they 'pose serious dangers to human and animal health that are related to the transmission of antimicrobial resistance and sensitivity' (Preamble). In fact, no fewer than 27 pieces of legislation scaffold a regulatory architecture that makes strong efforts to control the production, commercialization, prescription, use and even disposal of veterinary medicines, the presence of residues of veterinary medicines in food of animal origin for human consumption, and levels of AMR. Some of these regulations introduce material objects like veterinary prescriptions for the sale of antibiotics or require the presence of a veterinarian at all shops where veterinary medicines are sold and where farmers can receive advice on animal health problems. This speaks to a thoroughly modern country when it comes to the appropriate use and control of veterinary medicines.

Yet the country's efforts to deal with AMR reveal a very different understanding of the problem to that of the UK and Europe. In the livestock farming sector, dealing with AMR is the responsibility of the Instituto Colombiano Agropecuario (ICA; Colombian Agriculture and Livestock Institute), which has a National Plan to monitor the presence of antibiotic residues in milk or meat, and the Instituto Nacional de Vigilancia de Medicamentos y Alimentos (INVIMA; National Medicines and Food Surveillance Institute). The INVIMA is charged with preventing the presence of bacteria in foods of animal origin and their derivates. It conducts inspections and when specific bacteria are found they are tested for sensitivity to a selection of antimicrobials and antibiotics including colistin, a last resort antibiotic considered critically important for human medicine. What is being controlled is the residues, the end of the chain in the use of antibiotics rather than their initial administration. In other words, in contrast to EU and UK regulations concerned with the *emergence* of AMR, the concern in Colombia is focused on its *transferability* to humans.

Between 2016 and 2017, I conducted interviews with officials from the ICA, INVIMA, Ministry of Health and Ministry of Agriculture as part of an Economic and Social Research Council research project looking at animal

husbandry practices carrying potential AMR risks, at veterinary medicine prescription practices and at the regulatory system ruling their circulation. My findings suggest the challenges to the mobility of the RUMA approach go beyond the need for additional funding, training and time. The first challenge is the fact that dairy and beef farming operate significantly as part of a traditional peasant economy (DANE, 2020) which is loosely articulated both to processing industries, which in some cases impose product quality and farming practices standards, and to the 'informal' market, through which at least 45 per cent of milk circulates (Minagricultura, 2020). This market operates very locally through *lecheros*, who collect milk on motorbikes, bicycles, horses or donkeys and sell it to local cheese or yogurt makers and bakeries (Chohan et al, 2023). This traditional market was classified as 'informal' as the country made efforts to improve the competitiveness of the national milk sector anticipating the impacts of the free trade agreement signed in 2010 with the EU. Nested in the context of the negotiations, AMR regulations, which included stipulations on the use of veterinary medicines, were strongly associated with the negative consequences of the free trade agreement and therefore were so unpopular that the government withdrew them in the wake of massive agricultural strikes. Second, veterinarians do not hold the monopoly over the sale of antibiotics. Antibiotics are mostly sold at agricultural shops, and the legal requirement of a prescription by a veterinarian is seldom complied with; pharmaceutical laboratories have farm-to-farm salespeople and there is a market in adulterated and smuggled veterinary medicines.

In the language of policy mobilities, in Colombia the material objects that mobilize the RUMA and O'Neill approaches for the control of AMR – intramammary tubes, vaccines, bottles of antibiotics, prescriptions – circulate through systems where the setting of targets cannot be operationalized. First, the key actors in the circulation of veterinary medicines, from laboratory sales representatives to agricultural shops, are very different from those in the UK and Europe. Second, there is a very different understanding of what is being controlled – that is, residues in food products rather than doses of antibiotics in cows. And third, there is a set of costs, to farmers and to governments, beyond the purely financial. The 'formalization' of the 'informal' market transforms complex local economies that shape the social fabric of communities threatening livelihoods and even existence. Efforts to ensure a veterinarian behind the counter at every agricultural shop have also faced political opposition, as veterinarians do not necessarily live near remote milk production localities. Even if they did, farmers often consult over the phone, directly with the shop. According to the O'Neill report, to deal with this difference in context, what Colombia needs, apart from money, is time. But the linear, chronological time assumed in this recommendation obliterates the social, political and economic contexts that policies are

generated in and transferred to, and this obliteration is also a manifestation of global inequalities and power relations.

Conclusion

If one pays attention not only to how and where animals move, but also to what they mobilize and to what moves inside their bodies, it becomes evident that animals and their mobilities participate in different ways in our politics. By thinking in a materiality key, I have shown how the control of diseases is made ontologically and politically possible via the complex assemblage of objects and regulations that the cattle passports, material and mobile, bind together. Animal bodies, and the material objects that travel with them, are both the objects and subjects of our politics. By moving together with the animals to whom they give subjecthood, passports mobilize and materialize policies of public health, food safety and market completion and harmonization. The passports accomplish the time trick of offering a window into the past in case it is needed in the future when disease is identified. I have also looked at the mobility of policies to control AMR, a much more ontologically slippery process. The case of Colombia suggests that some temporal tricks are easier to perform than others. It reveals the importance of context and politics that cannot be reduced to an unscrutinized concept of 'time'. Indeed, O'Neill's diagnosis has an implicit politics: What power moves and how does it move in his prescription of the necessity of 'time'? How might the need to grant more time to LMICs be read from a decolonial approach that is awake to its timescapes?

Born 8,000 miles away, Copito receives from his mother Mariposa and his owner Melba the same care as 2356. But he will move through a different world in different ways. How might a more careful politics of time give us a better chance to care for all these lives, human and animal, here and there? How might mobility studies engage with movements that are actually counter-movements, like bacteria becoming resistant or regulations being rejected? And what might studies in policy mobilities learn from processes by which policies are sent back to the place they came from?

Notes

[1] This research project 'Animal husbandry, prescribing practices and the control of veterinary medicines in Colombia's "Livestock Revolution"' was funded by an Economic and Social Research Council grant (ES/P00475X/1). I am grateful to Ben Hunt and Bex Boenke for information on dealing with cattle passports, to Bridget Anderson for editorial advice and support and to my partner, Trevor Irwin, who listened and challenged and provided writer's retreat conditions as I wrote in Stockholm.

[2] This statement is very often quoted as 'animals are good to think with' but the original is 'bonnes à penser'. See Garber (2008) and Haddon (2014) for discussions on the addition of 'with'.

[3] There were other theories, including that of C.F.W. Schrader, who believed it originated in Dutch and German ports (Erickson, 1961).

[4] I want to signal two points I cannot go into here. First, passports also materialize the power and borders of the state (see Torpey, 1997); second, the system is not infallible – it has blind spots that reveal the limits of such power and borders.

[5] These labels carry political consequences that are beyond the scope of this analysis. I want to at least acknowledge them by referring to them within inverted commas.

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