ORIGINAL RESEARCH

Are animal breeds social kinds?

Oriol Vidal[1,2] · David Teira[2]

Abstract

Breeds are classifications of domestic animals that share, to a certain degree, a set of *conventional* phenotypic traits. We are going to defend that, despite classifying biological entities, animal breeds are social kinds. We will adopt Godman's view of social kinds, classifications with predictive power based on social learning processes. We will show that, although the folk concept of animal breed refers to a biological kind, there is no way to define it. The expert definitions of breeds are instead based on socially learnt conventions and skills (artificial selection), yielding groupings in which scientific predictions are possible. We will discuss in what sense breeds are social, but not human kinds and in what sense the concept of a breed is necessary to make them real.

Keywords Race · Breed · Human kinds · Domination · Amnesia

1 Breeds as kinds

Animal breeds are classifications of domestic animals. The domestication process most likely originated in the work or products these animals contributed to the survival of our own species. Today, most animal breeds are either pets (accessories to human leisure activities: companionship, beauty, racing, etc.) or inputs in the food industry. Breeders sustain their breeds through artificial selection, deciding which animals to mate so that the progeny exhibits some desired phenotypic traits. Breeds are therefore kinds, they are defined according to clusters of properties (the relevant phenotypic traits) that usually co-occur in the world (Khalidi, 2010). The question we are going

✉ Oriol Vidal
oriol.vidal@udg.edu

David Teira
dteira@fsof.uned.es

[1] Departament de Biologia, Universitat de Girona, Girona, Spain

[2] Dpto. de Lógica, Historia y Filosofía de la Ciencia, UNED, Madrid, Spain

 Springer

to explore in this paper is what sort of kinds animal breeds are, whether natural or social.

The division between natural and social kinds is often explained as if the former reflected the structure of the world, while the latter reflected instead human interests and actions (Bird & Tobin, 2018). For the realist about kinds, changing natural kinds is not within our control, whereas social kinds are as open to change as any social convention. Breeds challenge this dichotomy since, one the one hand, they may look as natural as any other animal classification, but, on the other hand, their existence clearly depends on human intervention (via artificial selection). As we are going to see in more detail below, breeds have some typical features of standard natural kinds (Bird & Tobin, 2018). Breeds have "kindness": they form easily recognizable phenotypic groupings, and when there is an overlap between breeds, it is easy to ascertain whether one is a subkind of the other, since a properly defined breed has a genealogy in the form of a pedigree. Crucially for our argument below, breeds allow quite precise inductive inferences about the phenotypes of the progeny.

At the same time, breeds, like species, lack intrinsic properties and, unlike species, they do not feature in laws of nature. And this is precisely because the defining phenotypic traits of each breed are ultimately a convention depending on human interests, and as durable or volatile as the latter. However, for those who argue that the standard way of identifying human kinds "is by reference to what is being classified" (Khalidi, 2010, p. 346), animal kinds should not count as social. There are artificial molecules that only exist thanks to human intervention: if we accept breeds as a social kind, shouldn't these molecules count as social too? The alternative would be to ground social kinds on the awareness of the subjects of classification. And, by most standards of awareness, breeds would not count as social kinds.

Following Godman (2020), we think that that social kinds arise from social learning processes and power asymmetries, combined in different degrees, independently of the awareness of the category members. Animal breeds, like Longhorn cattle or Siamese cats, would be social kinds to the extent breeders learn from a community how to generate *new tokens*. If we adopt Godman's approach, animal breeds would be as social as artificial molecules, agricultural plants or any other culturally instantiated class. Through social learning processes, all of these categories would generate historical lineages of reproduction, in which scientific predictions would be possible.

Although in Godman's approach the sociality of animal breeds as kinds seems straightforward, there are a number of immediate objections. First, at least in the Western world, animal breeds are popularly perceived as a biological kind: is this perception a collective mistake? Second, if artificial selection is the mechanism allowing breeders to generate the kind, it is biology, rather than any social law, what makes the phenotypes of the progeny predictable. Finally, even granting that animal breeds are social kinds, since the animals themselves do not need any social learning to become part of the kind, should we treat these categories as different from human kinds, where the members take an active role in their reproduction?

Sections three to five present an answer to each of these questions. In Sect. 2 we will present an introductory overview to the modern concept of breed. In the sixth, and concluding, section, we will take stock and discuss to what extent the reality of animal breeds depends on concepts alone. As we are going to see, the study of animal

breeds allows us to understand the complexity of human kinds and how difficult it is, comparatively, to intervene on them.

2 The modern concept of breed

Let us start our argument presenting the modern concept of breed, the target of our analysis. Breeds have been defined, for the last two centuries, in terms of replicable types, a set of phenotypic features that breeders can reproduce in the progeny of an animal. Today these types are explicitly defined in terms of social conventions, as we will see in Sect. 4. But for our argument it is important to notice that the modern concept of breed was initially articulated as a purely biological type.

Domestication is a process of evolutionary change that results from the combination of natural and artificial selection. The first animal to be domesticated was the dog, 20,000 to 40,000 years ago (Botigue, 2017), and we can safely assume that, soon afterwards, domestication brought about regional differences in both pets and production animals. The modern concept of *breed* emerged much later, through novel practices in animal husbandry that historians have first documented in eighteenth century Britain. As Rebecca Woods puts it, "the modern notion of a breed as a replicable type itself gained currency around the same time in recognition of two concurrent foci in the shaping of livestock—the ability of a skillful breeder to impress human desiderata (size, color, form) on a group of animals, and increasing awareness of the variety and distinctiveness of type" (Woods, 2017, p. 45). On the one hand, there was an increasing attention to types in the emerging literature on animal and human taxonomies. In particular, animal breeds were often classified according to "national" characteristics, considered valuable in certain contexts (Ritvo, 1997, p. xiii). On the other hand, British breeders systematized animal husbandry, the selection of breeding males and females, in order to produce an offspring with the desired phenotypes. They understood their job as a gradual *improvement* of animal livestock, where success was the achievement of a replicable type, an animal progeny endowed with all the canonical traits. This ameliorative approach to breeding "seems to have been largely absent before the eighteenth century" (Russel, 1986, p. 13). These two approaches are modern in the sense that they pivot on ideal animal types. In both cases, these types are identified through a set of given traits which can be passed to the offspring if the correct breeding cross is guaranteed: either granting the "purity of blood" to preserve ancestral types or pairing the best males and females to get an improved offspring. There is a tension between these two approaches: while the former is centered on preserving an ideal ancestral type, the pure-blood, the latter is focused on obtaining a hypothetical, future ideal type. In practice, though, the breeding strategy is the same.

A landmark in articulating the modern concept of breed was the creation of the Leicester Longwool sheep by Robert Bakewell (1725–1795), a British pioneer of selective breeding (Woods, 2017). Before Bakewell, it was widely assumed that relevant phenotypic traits in the lowland sheep were environmentally determined (Russel, 1986, p. 194). Cooler winter temperatures and food availability would respectively account for the quality of the fleece and the size of the sheep. There is no evidence in the historical record of selective breeding in the sixteenth and seventeenth centuries,

although there was some awareness about the influence of a poor tup on a flock, as males father so many lambs. Even if some expert graziers had noticed that there were limits to such environmental plasticity, usually there was no active choice of rams or ewes for breeding. In fact, before Bakewell, there was only a minimal management of flocks, mainly placing them in an adequate environment to secure proper fertility and lamb growth (Russel, 1986, p. 194).

Eventually, a few experts claimed that some traits (hardiness, size and fleece weight) were expected to increase if larger rams were used (Russel, 1986, p. 193). Bakewell tested this conjecture through his selection schemes, choosing sophisticated traits as goals. As (Russel, 1986, p. 201) points out "he chose animals which looked right, which in his terms meant those that were easy to fat, were thin-legged (..) and conformed to the shape which he believed would reflect the best carcass form for flesh and fat distribution". In other words, Bakewell targeted an economically profitable type.

Bakewell selected those ewes and rams displaying the desired type, sending not conforming animals to slaughter. To get more uniformity in his flock, he promoted inbreeding. In the 1770s, only three decades after Bakewell started his program, his Leicester Longwool sheep had spread throughout the country, displacing the local pasture sheep (Russel, 1986, pp. 196–198). Although Baker was not the only breeder implementing artificial selection methods, he was the most successful. He nailed some phenotypic traits with great market value: rapid growth rate and efficient food conversion (Russel, 1986, p. 201). Bakewell disregarded purely ornamental features, and planned for big and fast-growing lambs, producing high quantities of cheap meat.

Bakewell represents the first successful attempts to imprinting human preferences on groups of animals and his methods were soon implemented on other breeds with equal success. Selective breeding is nowadays the norm in domestic animal husbandry, and it is at the origin of current breeds. As we will see in more detail in Sect. 5, contemporary breeders draw on social conventions rather than biological types. Suffice it to say now that the definition of a breed is nowadays relative to the breeder's association developing the type.[1]

However, at least in the Western world, the biological concept of breed still prevails: most people understand animal breeds as if they were some sort of biological kind. For instance, breeders often speak of *true breeding*: in the words of the American Kennel Club, "the simplest way to define a breed is to say it always *breeds true*. That is, breeding a purebred Irish Setter to another purebred Irish Setter will always produce dogs instantly recognizable as Irish Setters.".[2] This definition relies on the continuity of a type after reproduction, somehow reminiscent of a biological species. As we are going to see next, this is a misguided analogy.

---

[1] For instance, for the United Nations Food and Agriculture Organization (FAO), breeds "are recognized as distinct intraspecific groups, the members of which share particular characteristics, which distinguish them from other such groups, and formal organizations usually exist for each breed or breed group." (Rege, 2003) Food and Agricultre Organization of the United Nations (FAO), breeds "are recognized as distinct intraspecific groups, the members of which share particular characteristics, which distinguish them from other such groups, and formal organizations usually exist for each breed or breed group.".

[2] See their website: https://www.akc.org/dog-breeds/ (Last accessed on September 23, 2022).

3 Animal breeds are not biological kinds

As far as we can tell, no contemporary author has tried to rationalize the idea that animal breeds are biological kinds. Still, breeds are presented in ordinary discourse as a *covert* kind (Mallon, 2018, pp. 182–183), a natural kind that, as we are going to defend next, is indeed social. A canonical example of covert kind, for Mallon, would be *race* (*ibid*.) And, indeed, over the eighteenth and the nineteenth centuries the concepts of human races and animal breeds showed some interesting parallelisms (Zelinger, 2019). Let us assume, if only for lack of a better alternative, that the strongest arguments to defend the possibility of breeds being a biological kind will shadow some of the existing arguments for the biological reality of races. We are going to see that none of them works (Glasgow, 2010) considers three defensible forms of biological realism about races, not presupposing any deep essence as their foundation. *Superficial theories* would be those in which races are defined on the basis of sets of visible phenotypic traits. *Genetic racial realists* are those who defend that the defining set of traits is a genotype. *Populationists* argue instead that races are groups of people generated through reproductive isolation over a long period of time, in which the group members reproduce among themselves significantly more than outside the group. (Glasgow, 2010) proceeds to debunk these three approaches as follows.

Against superficial theories, Glasgow contends that all visible traits (e.g., skin colour) exhibit a continuous gradation such that any division between groups would require a conventional, arbitrary, boundary. A race so defined would not be a natural kind. Against the genetic and populationist approaches, Glasgow raises a twofold objection. On the one hand, known genetic clusters do not correspond to folk racial classifications: this is a mismatch objection. On the other hand, constraining the search for genetic clusters so that they would map onto folk races would fall prey to the arbitrariness objection: those clusters wouldn't constitute a natural kind, but the genetic underpinning of a conventional classification.[3]

As we have just seen, up until the rise of animal genetics, animal breeds were characterized through superficial theories. Animals (and especially domestic animals) display variation in their phenotypes in a way that our species seems to appreciate: colour, shape, size or even disposition are conspicuous traits for the human eyes. Some of these traits have been used to classify domestic animals. Longhorn cattle, for example, were originally animals from Lancashire (Russel, 1986, p. 16) and treated as a single (geographical) stock. Although they had some interesting traits for the breeder (e.g., they were big animals capable of resisting droughts), their horns, longer than those of cattle in other counties, became the defining characteristic. This is a *superficial* classification, in the sense of Glasgow (2010, p. 86). Breeds are usually defined through co-occurrent visible traits that originate in a (hypothetical) geographical region (i.e. the Arabian horse, the Newfoundland dog, etc.). But there is no underlying biological reality for such breeds: breeders and buyers set the boundaries arbitrarily. E.g., the

---

[3] As Francesco Guala observes (personal communication), "many philosophers, following Boyd, now reject the requirement that real kinds have sharp boundaries, because many canonical examples fail to satisfy it". The arbitrariness objection does not aim to deny the existence of natural kinds, but rather to debunk the possibility of any straightforward correspondence between gene clusters and our folk racial classifications. A Boydian concept of race would avoid the objection (Boyd, 2010, p. 222).

definitory length of the Bulldog snout is much shorter now than it was in 1874, when one of the first club of breeders was founded. So, even if short snouts are a characteristic trait of these animals, breeders can define at will how long is "short" and modify the animals accordingly.[4]

Likewise, populationism does not seem to have much traction on animal breeds. The mismatch between breed and population is accepted by breeders and geneticists alike. Population genetic studies do focus on breeds, but for purely practical reasons -it is the easiest way to get samples. As a matter of fact, we may find different breeds belonging to the same population if, for instance, there is a political border dividing a geographical region, with each breed on a different side of the border. We may also find individual animals excluded from a breed despite sharing the ancestry (belonging to the same genetic population), because of a phenotypic defect.

Genetic racial realism, in contrast, seems to hold some ground when applied to breeds. Once a breed is defined by a given set of phenotypic traits, if only those animals displaying the full set are selected as breeders, there is going to be a fixation of alleles in the group of genes related to those phenotypes. As Glasgow (2010, p. 90) points out, we may create apparently biological kinds clustering traits, if these traits are correlated with DNA markers. But the "naturality" of these kinds fall prey to the arbitrariness objection (Glasgow, 2010, p. 90). Allele frequencies in natural populations arise from the joint action of the four forces driving evolutionary change (mutation, migration, genetic drift and natural selection). In breeds, artificial selection is the major driver of changes in allele frequencies, often focusing on phenotypic traits that, under natural conditions, would either experience no modification or even would be selected against. Thereby the arbitrariness: whereas species should be self-sustaining populations, the breeds' subsistence depends on the breeder's decisions about the relevant traits.

In short, biological realism is not a tenable position about animal breeds. The stability we observe in the features defining an animal breed is due to human intervention, Only through artificial selection breeds reach a degree of genetic stability allowing breeders to predict whether the progeny will exhibit the desired traits. Since this stability is the source of its *inductive fecundity* as kinds, let us examine in more detail where how it is achieved.

4 The stability of animal breeds

Social kinds are known to be stable: central features of our social life such as our degree of coordination would be difficult to explain were it not for the stability of kinds such as our social roles (Mallon, 2016). The stability of social kinds is presumably grounded

---

[4] It may be argued that the arbitrariness is just apparent: when breeders decide to bring about a different breed calling it by the same name they used for a predecessor breed, they are not changing the definition of the latter, just recycling the name for a different animal. But this objection would miss the point: those two types of animals exist only because breeders decide to sustain them. As a matter of fact, it sometimes happens that two different breed names apply to the same animal just because the breeders want to differentiate it. In the Iberian Peninsula there are the Ojalada and the Xisqueta sheep are found in neighbouring areas -broadly, speaking Castille and Catalonia. These breeds look the same and could be in fact, the same. But there is a political border dividing the territory in which the sheep live and the breeders on each side of the border have decided to name them differently.

on their causal traction on our social world. A telling sign of a kind's stability would be the predictions it allows us to obtain, from the basic regularities organizing our everyday life (what to expect from each social role) to scientific forecasts about the more complex dimensions of our society (e.g., the impact of race on income).

Let us consider now what sort of stability artificial selection achieves. The proximal source of stability for all animal breeds is the breeder's intervention deciding which animals are going to be parents of the next generation. Although individual breeders may learn individually how to generate some phenotypic traits, most breeders learn about artificial selection techniques socially: they rely on the work of previous generations of breeders that they wouldn't have been able to reproduce on their own. Breeding traditions create the historical lineages in which predictions about the progeny become possible. Behind this breeding traditions there are social forces: sometimes it is a matter of simple taste about the phenotypes (as it is often the case in pets and ornamental animals), but often it is direct market demand. When animal production becomes an economic activity, all decisions regarding animals (nutrition, husbandry, welfare, etc.) will hinge on profit maximization. In both scenarios, animal classification plays a key role. And as we are going to see, the predictions about phenotypic traits are as short lived as any other prediction about the underlying social forces supporting them.

For each breed, animal classification usually generates a standard: a description of phenotypic characteristics (color, size, shape, performance, etc.) defining the paradigmatic animal. The definition of these standards depends entirely on the breeder's consensus. When breeders agree, they may unify phenotypically similar animals within a single breed as it happened in Britain with the creation of the Siamese standard breed in 1892, bringing together Thai cats that were increasingly popular during the nineteenth century all over Europe. Conversely, lack of consensus among breeders may generate different standards from a single stock of animals, like English and American Hereford cattle.

The stability of pets crucially depends on the breeders' consensus on a standard. The standard will guide the artificial selection of animals for reproduction. The skill of each breeder interpreting and implementing the standard will yield animals with a stable phenotype, whose traits may be discernible even for the non-trained eye.[5] Hence, in pets, a breed will be as stable as the underlying standard. Changes in this standard will only alter the breed to a point. In cats, for instance, there are significant associations between several genetically unrelated traits such as behaviour, coat type and eye colour (Wilhelmy et al., 2016) that appear because the traits are important in the breed's standard. But in the Siamese breed, head shape has evolved as breeders sought more triangular profiles, without changing the typical white and black coat colour. This stability allows breeders to predict the offspring of purebred animals, at least for some conspicuous traits with simple patterns of inheritance.

As for the stability of production animals, it ultimately depends more on market demand than on the breeders' consensus about a standard. They may even diverge: in the definition of pig breeds standards, *growth* was not a fundamental trait, but it is crucial for the artificial selection of future boars and sows. In production animals,

---

[5] The genome of pets exhibits clear traces of the effects of these breeding strategies. In dogs, for instance, there are at least 155 genomic regions with strong signatures of recent selection (Akey et al., 2010).

standards are mainly used to identify phenotypic flaws leading to the cull of any animal exhibiting them. Whereas in most pets, expert judgment plays a key role in the artificial selection process, in production animals the process is driven by statistical data analysis. This achieves unparalleled levels of breed homogeneity, that will remain stable, barring any market shift.

As in standard based breeding, the industrial search for stable phenotypic traits will bring about genotypic changes in the animals under selection. Unlike colour or other relevant traits in pets, many economically relevant traits (growth, fat deposit, milk production, etc.) are not simple, but polygenic traits that cannot be easily predicted with traditional breeding methods. Industrial artificial selection uses instead complex mathematical models to detect the best animals for parenting the next generation. These methods will lead to the identification of the genetic architecture of each selected trait, allowing breeders to predict which complex phenotypes will arise well before they are observed. For instance, newborn male dairy calves are included in selection programs according to the producing capacities of their mother, sisters, aunts and almost all their related females. The price of their semen doses will depend on the expected increased production of their offspring. When the actual production data of their daughters is available, those prices might be adjusted, as expected increase is more reliable.

As in pets, artificial selection will bring about homogeneous groups in production animals, exhibiting solid associations between traits without any biological significance: e.g., for cattle, sheep and pigs, see (Lee et al., 2015; Purfield et al., 2020; Safari et al., 2007).[6] This degree of stability allows for quite sophisticated predictions about the breed's offspring. It is possible, for instance, to calculate the heritability of particular traits (Utrera, 2004) (Safari et al., 2005; Van Wijk et al., 2005). Heritability in combination with phenotypic measures and pedigree information can be used to calculate individual breeding values: these are predictions about the phenotypic traits of an individual's offspring, like the growth capacity of piglets born from a specific boar or the expectable milk production of a bull's daughters. Breeding values are reliable and broadly used in animal production. In species such as dairy cattle, in which artificial insemination is the norm, breeding values establish the price of males' sperm doses.[7]

Summing up, phenotypic traits in animal breeds are as stable as the underlying social dynamics that sustain them. Some phenotypic traits in breeds have reappeared regularly throughout the historical record, suggesting a stable human interest in the trait. The most famous example is the Appaloosa horse, a breed characterized by a very unusual coat colour that can be identified in Paleolithic cave paintings. As for modern breeds, the most stable breeds are those used for industrial purposes. For instance, selection for growth in turkey breeds started in the 1960s. Since then, their weight has grown reaching the highest biologically possible values. If turkeys increased their weight even further, the adults would not be able to walk. Holstein Frisian cows illustrate the same point: their milk production is quite often only limited by their energetic metabolism and food intake capacity.

---

[6] Selective breeding has also left genomic selection footprints in cows (Saravanan et al., 2021), sheep (Ruiz-Larranaga et al., 2018) and pigs (Munoz et al., 2019).

[7] See, for instance, https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/breeding/breedplan/reading-catalogue (accessed on Nov 11, 2021).

In contrast, domestic breeds that are mostly ornamental may display much higher levels of variation and temporal change. The progression of the American Siamese cat might be taken as an example of the degree of change that follows after the definition of beauty standards. For most breeders, once those standards are common in the animals of the breed, a new definition should be established and therefore selection will never stop as a source of change.

From the standpoint of stability, animal breeds are therefore more like social than like natural kinds, since their stability originates in fact in the social forces controlling artificial selection. If we compare it to the stability biological species, at least of animals with some potential for domestication, we will be speaking of very different orders of magnitude. Species are a homogeneous group of individuals, sharing genetic information and ancestors. Species appear and exist because of the autonomous dynamics of living organisms and ecosystems, significantly thanks to natural selection. There are taxa with high levels of stability while others can easily vary. For instance, in the fossil record, the consensual view is that crocodilians are found without significant variations in the last 85 million years, a remarkable feature that is even more extreme in the *living fossil* horse crabs: they have been around during 445 million years.

It is true that there are examples of rapid speciation events. E.g., in Darwin finches, a new lineage has appeared and stabilized from a colonization event involving a single individual in 1981. However, for most functional traits (or adaptations), there are significant constraints to change. In general, unless there are rapid changes in the environment, species will remain constant during long periods of their existence. For large mammals (like those humans domesticated), the species duration in the fossil record is 3.21 million years (Prothero, 2014). For most animal species, it is possible to make long term predictions about their phenotypic traits.[8]

5 Are animal breeds social, but not human, kinds?

Animal breeds are created through socially learnt practices from which arise historical lineages that allow for predictions as stable as the social forces stabilizing the breed. Although the social kindness of animal breeds is unproblematic in Godman's approach, it is certainly at odds with many other standard accounts (Khalidi, 2010). Collapsing artificial molecules, agricultural plants and animal breeds with traditional kinds like race or gender seems too coarse. Even assuming that social learning is the driver behind all these kinds, it may be argued that for molecules, plants and breeds it only works one way: unlike in race or gender, the category members have nothing to learn for the kind to subsist. Shouldn't this difference be taken into account? E.g., human

---

[8] We received the following counterexample: there are unstable biological kinds such as viruses, changing so quickly that predictions about them would hold for an even shorter term than for any social kind. It is open to discussion whether viruses should count as a living organism comparable to either species or breeds, but to properly answer any similar counterexample we should focus on the generational cycles underlying any prediction about species or breeds. For example, in pig breeds that reproduce under artificial selection, changes happen in just a few generations, whereas for wild pigs (undergoing mutations, migration, genetic drift and natural selection), changes require many more generations. Hence, under natural conditions, predictions about animal kinds have a longer reach than about animal breeds.

kinds would be those social kinds in which the category members should take part in the social learning processes sustaining the classification.

Becoming member of a human kind requires some social learning mechanisms. Most social ontologists focus on how human classifications are proximally based on individual decisions (e.g., game-theoretic equilibria (Guala, 2016). As Ian Hacking canonically argued, people learn from other people how to become part of certain kinds through, e.g., identification processes like imitation. Still, (Mallon, 2016, pp. 56–58) has persuasively argued that the intentions of the category members are often not enough to explain how social kinds work. Other people's representations about them have an influence on their behaviour (sometimes through automatic, non-intentional processes like implicit biases) and on their environment (as in racial segregation). Godman captures this same element through the idea of power asymmetries: social learning processes are imposed, in different degrees, on category members.

Most readers will easily grant that artificial molecules or agricultural plants may be social categories, in Godman's account, but there is neither social learning nor asymmetries of power to make them count as human kinds. As we are going to argue next, the case of breeds is more complicated, because there may not be social learning, but we think that we can properly speak of power asymmetries: breeds are endowed with reproductive agency, that artificial selection constrains. The point we want to make is that, if we want to distinguish, social from human kinds, it may be a matter of degree.

Artificial molecules or genetically engineered plants do not exhibit any agency: for most observers, the power of scientists over their creations lacks any moral connotation. When there is agency involved on both sides of the power relation, we speak of domination: "a kind of unconstrained, unjust imbalance of power that enables agents or systems to control other agents or the conditions of their action" (McCammon, 2018). The master/slave relationship is an extreme example of domination. Traditional defences of slavery often denied slaves any human agency, reducing them to personal property (*chattel*) of their masters, as if they were artificial molecules or genetically engineered plants. As soon as agency is acknowledged by any of the involved parties (or any stakeholder, as it is often the case with animals) the power asymmetry becomes social and we start speaking of domination.

Do animal breeds exhibit any agency? There are various arguments on the table to grant animals agency. One particularly interesting for our case is (Wilcox, 2020), for whom possessing sentience is enough to possess agency. For Wilcox, sentience is the ability to experience mental states with a positive or negative feeling such as pleasure or pain. These experiences would constitute motivating states like desires, according, at least, to the attitudinal account of sensory pleasure. Wilcox argues next that these desire-like states would count as motivating reasons for action. This would be enough to attribute agency to, at least, some animals.

There is a general consensus that both pain and pleasure are experienced by domestic animals, even though it is not possible to measure them directly. Nonetheless, the behavioural and physiological responses of domestic animals are analogous to those of our own species. The current consensus is that vertebrates feel pain (Jerez-Cepa & Ruiz-Jarabo, 2021) and mammalians and birds experience orgasms (Fox & Fox, 1971). These feelings of pain and pleasure also play a role in explaining sexual selection, and,

in turn, sexual reproduction itself (Lumley et al., 2015). Hence, in the wild, animal agency, in Wilcox sense, is key for the survival of mammalians and birds.

Consider now artificial selection. Breeders sustain or modify domestic animal kinds intervening on their mating choices. In this regard, it makes senses to speak of breeders *dominating* breeds: breeders decide who their animals will breed with (or if they will breed at all). In artificial selection, animals don't have a choice, be it a world-wide commercial scheme for improving dairy bovines or a private breeder of fancy pigeons searching for a different plumage. In any program of selective breeding, the key points are selecting which animals are going to produce the next generation and deciding the actual crosses of males and females. Moreover, if a selected couple refuses to mate, artificial insemination is available for all domestic species.

Even granting that animal breeds have agency, and are therefore part of a social relation (domination), it may be argued that proper human kinds require active engagement via social learning mechanisms. Human slaves were not only dominated, they had to learn how to behave according to the relevant social norms. The key difference lies in the goals of the dominating party: unlike slave owners, who needed the cooperation of slaves to achieve their goals, breeders do not need animals to take active part in the acquisition of the phenotypical traits they are interested in. Artificial selection alone is enough to yield these traits.[9]

Hence, if we want to make a distinction between social and human kinds, considering the participation of the category members in the construction of the kind, the distinction will be a matter of degree. There will be social kinds entirely generated through the social learning processes of their creators (like artificial molecules or agricultural plants). There will be human kinds in which both category members and their broader community contribute to the construction through social learning processes, more or less constrained by power asymmetries. And finally, in an intermediate situation, we have animal breeds, where there is no social learning on the part of the category members, but still there is enough agency to speak of a power asymmetry in its generating mechanism (artificial selection).

6 The reality of animal breeds

Let us take stock of our argument so far. We have defended that animal breeds are not biological, but social kinds. On the one hand, animal breeds do not fit some standard definitions for biological kinds. On the other hand, animal breeds originate in the social learning processes transmitting artificial selection techniques, according to the conventions of the breeders' communities. Animal breeds are historical lineages stable enough to ground scientific predictions. We will close this essay discussing in what

---

[9] A potential rejoinder would then be that artificial selection would work the same way in animal and plant breeds, but we would not speak of domination in plants. Our response is that plants have no reproductive agency: fertilization in plants usually is a process in which sperm cells (in pollen) are carried to the female flower without any direct intervention of the plants themselves. This has led to a controversy about the existence of sexual selection in plants, as it would "be applied to non-sentient hermaphrodites." (Moore & Pannell, 2011). In any case, the process of fertilization does not involve any actual behavioral or physiological response analogous to animal orgasms. Interestingly enough, artificial selection in plants produces varieties, not breeds.

sense animal breeds are real: more precisely, to what extent their existence depends on concepts alone. Because, as we are going to see next, they "fail" Mallon's amnesia thought experiment.

Mallon's experiment was addressed against S. Haslanger's views on the social construction of races. For Haslanger race is socially constructed because "it is, at least in part, constituted by our ongoing employment of racial concepts and conceptualized practices" (Mallon, 2018, p. 2). Were this the case, Mallon argues, if a bout of amnesia made everyone lose their racial concepts, "there would no longer be racial concepts or racialized practices" (*ibid*.). And this is somehow counter-intuitive, because the reality of race seems to depend on much more than our concepts: Haslanger's purely conceptual take fails to grasp it.

As we have already seen, Mallon advocates for a two-pronged approach to social kinds in which they are sustained not just by concepts alone, but also by structural constraints: a racially segregated urban environment will survive any bout of amnesia about racial concepts. Racial kinds would still exist to the extent that their causal effects (urban segregation) would still organize the lives of the amnesic population. Mallon (2018) leaves an open question: under which conditions are concepts and conceptual practices necessary to constitute a social kind?

The case of animal breeds suggests a general answer: when the generating mechanism of the kind pivots on the defining concept alone, this concept will be necessary (but perhaps not sufficient) for the kind to exist. The existence of animal breeds depends on successful artificial selection. And artificial selection becomes impossible if breeders lose, in a bout of amnesia, the relevant classification criteria (the concept of breed).

For a start, breeders can achieve a degree of correspondence between their *manifest* concept of breeds (the defining standards) and their animals that perhaps no human kind can match.[10] The degree of domination breeders exert on their animals' reproductive choices can be rarely matched in any classification of humans. There are no limits to the breeder's decisions, and it is quite common to use highly inbred crosses (father-daughter, siblings, etc.) that a majority of wild animals (and humans) would spontaneously avoid. Breeders become extremely demanding about how an animal should meet their standards. If the concept of the Thai cat was lost, they would have plenty of options to redefine the breed and there is no guarantee that they would agree on the same defining traits. Without the previous definition, there would be no constraint on artificial selection.

Even when prior definitions exist, they can be selectively ignored ("forgotten") in response to new circumstances. When breeders disagree about a stereotype, they can simply develop new competing breeds. We have already mentioned one of the most famous examples of such disagreements, the English and American Hereford cattle. Originally, this was a British breed exported to the US in 1817. Whereas the British breeders were concerned with the national purity of the breed, associated with endurance and resistance, US breeders cared more about market demand for meat. The latter started selecting individuals for their size and precocity, in a way that soon

---

[10] Following (Haslanger, 2019), the manifest concept of a breed would be the a stereotype based on the relevant body features, shared by a majority of the speakers using the term For each breed, there is also an *operative* concept, not based on the stereotype but on the actual use. A dog that looks like a Pekinese, but without a pedigree (necessary for the manifest concept) will be called a Pekinese.

brought the American phenotype apart from the original British standard. For nearly 150 years, the British and American breeders used the same manifest concept, but gradually diverged on their operative concepts: animals that would count as Hereford cattle in the US would have not been accepted as the traditional UK Hereford cattle. Such a discrepancy on the operative concept interfered with sales: American cattle produced more meat, challenging the market value of the UK breed and generating potential conflicts between disgruntled breeders. The conflicts were sorted out around 1996 (Woods, 2017, p. 199) with the creation of two different standards, one for America and one for the UK, in which the manifest and the operative concepts were, at least for some time, reconciled for each breed. In both cases, the normative concerns of each community of breeders (national purity versus market demand) drove the articulation of the new standard.

Summing up, a sudden bout of amnesia about the concept of a breed would challenge artificial selection in a way that would make the socially constructed breed disappear. Abandoned domestic animals form feral populations which usually show that trend. As an example, feral pigs in the US are mostly hybrids of escaped domestic pigs from the 1500 s and wild boars released for game in the 1900s. They display mixed traits, with significant variation and without a definite set of phenotypes.[11]

Breeds would therefore exhibit an interesting social construction. On the one hand, they are supported by social mechanisms (e.g., market forces channelled via artificial selection) that are stable enough to secure the existence of breeds during long periods of time. On the other hand, as compared to other social kinds (e.g., race), it seems easy to change the underlying beliefs and desires of both breeders and their customers. The material constraints on, say, our appetite for pork can be satisfied by many different standards for pigs, and pigs are comparatively more malleable than human kinds in which artificial selection is not possible.

We may conclude that concepts are necessary to constitute a social kind when the causal mechanisms generating the kind hinges on them: the social learning of breeding skills requires grasping the manifest, operative and normative dimensions of each breed concept. As we saw in the previous section, the social learning processes underlying most human kinds are comparatively more complex, since, for a start, they require the active engagement of category members. And the causal pathways through which classifications work go beyond self-identification. In this regard, the breeders' amnesia we have just discussed supports Mallon's objection to Haslanger: human races are causally much more complex to sustain than animal breeds, and simple interventions on concepts probably won't do much to make them disappear.

---

[11] We received here the following objection: if a breed became reproductively isolated from other similar animals to a point that it "breeds true", would it cease to be a social kind and become a biological one? Our answer is negative: true breeding is different from reproductive isolation. True breeding occurs when the mating of two purebred animal yields an offspring with the phenotype of their parents. But purebred animals are capable of reproducing with mongrels of the same species. Organisms belonging to different species usually cannot reproduce and, if they do, the offspring is often sterile and different from their parents.

Declarations

Conflict of interest The authors declare no conflict of interests.

References

Akey, J. M., Ruhe, A. L., Akey, D. T., Wong, A. K., Connelly, C. F., Madeoy, J., Nicholas, T. J., & Neff, M. W. (2010). Tracking footprints of artificial selection in the dog genome. *Proceedings of the National Academy of Sciences of the United States of America, 107*(3), 1160–1165. https://doi.org/10.1073/pnas.0909918107

Bird, A., & Tobin, E. (2018). *Natural kinds*. Retrieved from https://plato.stanford.edu/archives/spr2018/entries/natural-kinds/

Botigue. (2017). Ancient European dog genomes reveal continuity since the Early Neolithic. *Nature Communications*. https://doi.org/10.1038/ncomms16082

Boyd, R. N. (2010). Realism, natural kinds, and philosophical methods. In H. Beebee & N. Sabbarton-Leary (Eds.), *The semantics and metaphysics of natural kinds* (pp. 220–242). Routledge.

Fox, C. A., & Fox, B. (1971). A comparative study of coital physiology, with special reference to the sexual climax. *Journal of Reproduction and Fertility, 24*(3), 319–336. https://doi.org/10.1530/jrf.0.0240319

Glasgow, J. (2010). *A theory of race*. Routledge.

Godman, M. (2020). *The epistemology and morality of human kinds*. Routledge.

Guala, F. (2016). *Understanding institutions*. Princeton University Press.

Haslanger, S. (2019). Tracing the sociopolitical reality of race. In *What Is Race?* (pp. 4–37). Oxford University Press.

Jerez-Cepa, I., & Ruiz-Jarabo, I. (2021). Physiology: An important tool to assess the welfare of aquatic animals. *Biology, 10*(1), 1–15. https://doi.org/10.3390/biology10010061

Khalidi, M. A. (2010). Interactive kinds. *The British Journal for the Philosophy of Science, 61*(2), 335–360.

Lee, J. H., Song, K. D., Lee, H. K., Cho, K. H., Park, H. C., & Park, K. D. (2015). Genetic parameters of reproductive and meat quality traits in Korean berkshire pigs. *Asian-Australasian Journal of Animal Sciences, 28*(10), 1388–1393. https://doi.org/10.5713/ajas.15.0097

Lumley, A. J., Michalczyk, Ł, Kitson, J. J., Spurgin, L. G., Morrison, C. A., Godwin, J. L., Dickinson, M. E., Martin, O. Y., Emerson, B. C., Chapman, T., & Gage, M. J. (2015). Sexual selection protects against extinction. *Nature, 522*(7557), 470–473. https://doi.org/10.1038/nature14419

Mallon, R. (2016). *The construction of human kinds*. Oxford University Press.

Mallon, R. (2018). Constructing race: Racialization, causal effects, or both? *Philosophical Studies, 175*(5), 1039–1056.

McCammon, C. (2018). Domination. *The Stanford Encyclopedia of Philosophy (Winter 2018 Edition)*. Retrieved from https://plato.stanford.edu/archives/win2018/entries/domination/

Moore, J. C., & Pannell, J. R. (2011). Sexual selection in plants. *Current Biology, 21*(5), R176–R182. https://doi.org/10.1016/j.cub.2010.12.035

Munoz, M., Bozzi, R., Garcia-Casco, J., Núñez, Y., Ribani, A., Franci, O., Garcia, F., Škrlep, M., Schiavo, G., Bovo, S., & Utzeri, V. J. (2019). Genomic diversity, linkage disequilibrium and selection signatures in European local pig breeds assessed with a high density SNP chip. *Scientific Reports, 9*(1), 1–14. https://doi.org/10.1038/s41598-019-49830-6

Prothero, D. R. (2014). Species longevity in North American fossil mammals. *Integrative Zoology, 9*(4), 383–393. https://doi.org/10.1111/1749-4877.12054

Purfield, D. C., Evans, R. D., & Berry, D. P. (2020). Breed- and trait-specific associations define the genetic architecture of calving performance traits in cattle. *Journal of Animal Science, 98*(5), 1–18. https://doi.org/10.1093/JAS/SKAA151

Rege, J. (2003). Defining livestock breeds in the context of community-based management of farm animal genetic resources. *Community-Based Management of Animal Genetic Resources*, 27–36.

Ritvo, H. (1997). *The platypus and the mermaid, and other figments of the classifying imagination*. Harvard University Press.

Ruiz-Larranaga, O., Langa, J., Rendo, F., Manzano, C., Iriondo, M., & Estonba, A. (2018). Genomic selection signatures in sheep from the Western Pyrenees. *Genetics Selection Evolution, 50*(1), 1–12. https://doi.org/10.1186/s12711-018-0378-x

Russel, N. (1986). *Like engend'ring like. Heredity and animal breeding in early modern England*. Cambridge University Press.

Safari, E., Fogarty, N. M., & Gilmour, A. R. (2005). A review of genetic parameter estimates for wool, growth, meat and reproduction traits in sheep. *Livestock Production Science, 92*(3), 271–289. https://doi.org/10.1016/j.livprodsci.2004.09.003

Safari, E., Fogarty, N. M., Gilmour, A. R., Atkins, K. D., Mortimer, S. I., Swan, A. A., Brien, F. D., Greeff, J. C., & Van Der Werf, J. H. J. (2007). Genetic correlations among and between wool, growth and reproduction traits in Merino sheep. *Journal of Animal Breeding and Genetics, 124*(2), 65–72. https://doi.org/10.1111/j.1439-0388.2007.00641.x

Saravanan, K.A., Panigrahi, M., Kumar, H., Parida, S., Bhushan, B., Gaur, G.K., Dutt, T., Mishra, B.P. and Singh, R.K. (2021). Genomic scans for selection signatures revealed candidate genes for adaptation and production traits in a variety of cattle breeds. *Genomics*. https://doi.org/10.1016/j.ygeno.2021.02.009

Utrera, A. R. (2004). Heritability estimates for carcass traits of cattle: A review. *Genetics and Molecular Research: GMR, 3*(3), 380–394.

Van Wijk, H., Arts, D., Matthews, J., Webster, M., Ducro, B., & Knol, E. (2005). Genetic parameters for carcass composition and pork quality estimated in a commercial production chain. *Journal of Animal Science, 83*(2), 324–333.

Wilcox, M. G. (2020). Animals and the agency account of moral status. *Philosophical Studies, 177*(7).

Wilhelmy, J., Serpell, J., Brown, D., & Siracusa, C. (2016). Behavioral associations with breed, coat type, and eye color in single-breed cats. *Journal of Veterinary Behavior, 13*, 80–87. https://doi.org/10.1016/j.jveb.2016.03.009

Woods, R. J. H. (2017). *The herds shot round the world. Native breeds and the British Empire, 1800–1900*. University of North Carolina Press.

Zelinger, A. (2019). Race and animal-breeding: A hybridized historiography. *History and Theory, 58*(3), 360–384.