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Exploring animal breeding through the lenses of authoritarian and liberal eugenics: why some breeding practices are wrong and what could be new ethical standards?

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Animal breeding is a mainstay of our relationship with domesticated species. However, it is sometimes leading to serious health and welfare issues, such as canine brachycephaly or double-muscling phenotype in Belgian Blue cattle. How then can we re-think our breeding system in animals? In this paper, I discuss the ethics of domestic animal breeding and new ways to achieve it. In doing so, I focus primarily on the concept of eugenics and its two major accounts: authoritarian and liberal eugenics. Indeed, the debates surrounding eugenics in humans is a quite prolific framework to question how we can justify animal breeding and has the merits to clarify the conditions needed to consider some practices as morally wrong (*e.g.* in the case of authoritarian eugenics). I argue that pure-bred breeding is comparable in many ways with authoritarian eugenics primarily because it does not consider the benefits for the animals but external factors such as beauty, productivity or certain behaviors. But arguing so raises the question whether this renders all types of animal breeding unethical. I refute this conclusion and give some arguments to support an active use of more ethical kinds of breeding systems. Specifically, I explore the concept of liberal eugenics and its limitations to defend a breeding practice that is both liberal and responsible. Such new standards can warrant a focus on animal welfare and put forward the central role of breeders in this process.

KEYWORDS

animal breeding, eugenics, liberal eugenics, imperative of responsibility, animal ethics

1 Introduction

Dog (*Canis lupus familiaris*) has been the first species ever domesticated, with a starting point, although debated, estimated around 15,000 years (Pang et al., 2009; Galibert et al., 2011; Zhe et al., 2020). Since then, dozens of vegetal and animal species have also been domesticated. In animals, the genetic selection underpinning this domestication was conducted under several criteria such as morphology (*e.g.* show dogs), physiology (*e.g.* milking cows or racing horses) or

behavior (*e.g.* working dogs). Such selection was first blind and intuitive, but the work of pioneers like Gregor Mendel (1822-1884), with his understanding of the basic principles of inheritance in pea plants and the concept of dominant and recessive genes, or Charles Darwin (1809-1882), with his theory of natural selection that explains how species evolve over time through the differential survival and reproduction of individuals with advantageous traits, lent theoretical support to genetic selection. While this selection has benefitted humankind and, to some extent, the animals themselves, it also had collateral effects on the health and welfare of the latter, which have been transmitted, and in some instances accentuated, across generations (Bessei, 2006; Star et al., 2008; Kirkwood, 2010; Oltenacu and Broom, 2010; Rodenburg and Turner, 2012; Sonntag and Overall, 2014; Grandin and Whiting, 2018; Van Marle-Köster and Visser, 2021). And because these sometimes extreme traits are desired for economic, aesthetic or functional reasons, the current breeding systems tend to maintain these traits to keep up with specific breed standards.

Some common examples of these collateral effects in veterinary sciences include the welfare impacts of genetic modifications in laboratory mice and rats (Grandin and Whiting, 2018), an increased risk of asymmetric growth and osteoporosis in laying hens (Star et al., 2008), an increased risk of lameness and sudden death syndrome in broilers (Bessei, 2006), an increased risk of mastitis and metabolic diseases in dairy cows (Oltenacu and Broom, 2010), or an increased risk of metabolic diseases in domestic horses (Bettley et al., 2012).

Another prominent example that is worth elaborating on is the breeding of brachycephalic dogs. Brachycephaly is a selected trait in which affected dogs have a short skull shape with wide cranial proportions (Ekenstedt et al., 2020). This phenotype has gained popularity among companion dogs because it is an attractive "baby-like" face. But such an appearance is associated with several congenital abnormalities, which ultimately result in breathing difficulties, thermoregulation impairments and digestive pathologies (Fasanella et al., 2010; Bovenkerk and Nijland, 2017; Darcy et al., 2018; Fawcett et al., 2018). These issues impede the capacities of affected dogs to explore their environment, to exercise or to make proper social interactions, thus reducing their welfare (Bovenkerk and Nijland, 2017; Fawcett et al., 2018). This example alone shows how some individual animals can suffer from our aesthetic or functional concerning breeding. This urges us to reconsider how we breed domesticated species and on what grounds we can morally decide to select or not a phenotype.

That is when the concept of eugenics might come in handy. By definition indeed, the concept of eugenics promotes "good births" in human beings, and this aim is even more resonant when one thinks of it in relation to animal breeding: is it not the primary purpose of breeding to produce animals with "good" outlooks, "good" performances, or "good" productivity? Yet, eugenics carries a strong negative connotation that is linked to its historical use on human beings. To take but one example[1], following the 1927 Supreme Court decision Buck v. Bell, the U.S. government started compiling a list of "socially unfit people for the protection and health of the state" and subsequently subjected them to lawful forced sterilization, including inmates and mentally or physically disabled people (Stubblefield, 2007; Hobson and Margulies, 2018; Molina 2021). These historical instances of human eugenics show what kinds of horrific actions can be achieved when such a concept has no ethical safeguards. In this paper, while acknowledging the large body of literature related to eugenic policies in humans, I want to put the focus on nonhuman animals and consider what the concept of eugenics and its different accounts may point out in the ethics of animal breeding.

Therefore, the first aim of this article is to bring together the notions of eugenics and animal breeding. In doing so, we can better understand what kinds of ethical issues are raised by our existing breeding systems. Notions such as authoritarian or liberal eugenics have put forward some extensive ethical debates that can help clarify in many ways our approach to animal breeding. I will argue that a common breeding system, pure-bred breeding, is similar to the notion of authoritarian eugenics, making it morally questionable. The second aim of this article is to explore moral principles related to populational genetic enhancement in order to defend a more acceptable way to breed animals. Specifically, I will defend a conception of eugenics that is both liberal [as defined by Nicholas Agar (2004)] and responsible [according to Hans Jonas (1984)].

2 The concept of eugenics and its relations to individual selection

2.1 Defining eugenics and selective breeding

Eugenics, from ancient Greek *ευ-* "good" and *γένος* "birth", literally means "a good birth". Its current meaning includes all actions that aim to improve the genetic quality of a given population (de Melo-Martin and Goering, 2022). This term was coined in 1883 by Francis Galton, a cousin of Charles Darwin, with the desire to create and maintain biological pureness within the human species (*i.e.* with as little genetic diversity as possible) (Russell, 2018; de Melo-Martin and Goering, 2022). The concept of eugenics is similar, but not identical, to the concept of genetic enhancement. The latter comprises all biomedical techniques that can increase one's physical or mental capacities (Douglas, 2013). In the case of eugenics, these improvements are however limited to the reproductive sphere, with biomedical techniques occurring before or during embryonic development. For the sake of this article, I will adopt the following definition of eugenics: all reproductive techniques that directly or indirectly aim to improve the genetic quality of a given population. Interventions such as mate selection or embryo engineering may be seen as eugenic, when they have the explicit objective to improve the genetic quality of the offspring. However, interventions such as gene doping or gene therapy ought not to be considered as eugenic if they are done after the embryonic development (*e.g.* as an adult) or if their effects are not heritable. It is quite interesting to see that this definition is very similar to the definition of selective breeding (also called artificial selection). This proximity is due to the fact that, historically, eugenics involved controlling human reproduction in a similar way as livestock

1 Some other infamous examples include policies perpetrated during WWII (*e.g.* "*Aktion T4*"). More information on the history of eugenics can be found elsewhere, *e.g.* (Russell, 2018; de Melo-Martin and Goering, 2022).

and crop production. Therefore, eugenics and selective breeding are just two sides of the same conceptual coin or, more precisely, they are two terms that refer to the exact same principles. And thus, using the lens of eugenics may better inform our understanding of animal selective breeding, as well as its ethical implications.

When discussing eugenics, it is important to understand the kind of arguments used to defend it. In particular, if we aim to assess what are the ethical implications of eugenics, we can first consider the following argument:

(P1) Direct or indirect reproductive manipulation of the embryonic genome can be morally permissible.

(P2) Direct or indirect reproductive manipulation of the embryonic genome can have benefits for any individuals.

(P3) An action which is both for the good of others and morally permissible is morally good.

(C1) Direct or indirect reproductive manipulation of the embryonic genome can be morally good.

Therefore, the conclusion, (C1), is claiming that improving the genetic quality of other individuals by reproductive techniques, *i.e.* using eugenics, can be morally good. At first sight, it seems rather unacceptable: who can be in their right mind and defend that eugenics would ever be morally good? I think that this gut reaction stems from a misconception between what eugenics is (the action of improving the genetic quality of a population through reproductive techniques) and how awfully it has been applied so far, especially in human history. Concerning nonhuman animals, evidence also suggests that the general public has a rather negative appeal to genetic modifications (Macnaghten, 2004; Frewer et al., 2013; Ormandy et al., 2013; Van Eenennaam and Young, 2018; Ritter et al., 2019). If we focus on the argument provided here, we can easily agree to (P3), as long as the notion of "good" is appropriately defined in a theory of value. For simplicity reasons, I will from now on assume that prudential value (*i.e.* what is good for individuals) is the only value that matters and that goodness *simpliciter* (*i.e.* what is good in general, or for the world) is actually the sum of all prudential values[2]. Of course, such a simplification bears several limitations, which I will discuss in the last section of this paper. The other two premises, (P1) and (P2), however, are not as readily acceptable as they may first appear to be. They need thorough investigation to uncover what is morally problematic in certain types of eugenics, and what can be done to defend it.

2.2 Is embryonic genome manipulation morally permissible?

For now, let us focus on the first premise. Two kinds of embryonic genome manipulations are to be evaluated: direct and indirect manipulations. When doing direct manipulations, an agent is actively interacting with the genetic makeup of an embryo through sampling, testing or editing (*e.g.* through preimplantation genetic diagnosis, PGD, and in vitro fertilization, IVF). Concerning indirect manipulations, no such interaction takes place on the embryo, but the genetic manipulation stems from a manipulation of the parents (*e.g.* through the genetic testing or phenotypic selection of the parents). In this latter case, I shall argue that the main ethical issue is to ensure the reproductive autonomy of the parents (that is, whether they want to reproduce, how they will reproduce and with whom). Indeed, if no direct manipulation on the embryo is possible, the only remaining way to manipulate their genome is to act on the parents themselves in order to shape the probability of a certain genetic makeup. This can be done by choosing the parents based upon their phenotypes or their genotypes. And in order to be ethically justified, this choice needs to ultimately come from the parents (Brake and Millum, 2021). That is why I argue for the respect of reproductive autonomy: the parents can clearly inform their choice with external information (*e.g.* by testing themselves for hereditary traits or by consulting a specialist), but the final choice is theirs. However, what if the parents are nonhuman animals? This does not change much, as it can be argued that some sort of reproductive autonomy is exerted during sexual selection, although it is an unconscious process of indirect embryonic genome manipulation. More conscious manipulation can be achieved by altering the reproductive autonomy with a paternalistic approach, where a third party (namely, the breeder) is actively choosing the parents on behalf of "what is good for their offspring". This leads us again to the question of the appropriate definition of "good". On another note, it can also be mentioned that this kind of indirect manipulation of the embryonic genome is, by far, the main fashion of selective breeding in domestic animals: a third party decides on "what is good" and chooses the mates accordingly (Martin-Collado et al., 2015; Meuwissen et al., 2016; Martin-Collado et al., 2018).

But another kind of embryonic genome manipulation that deserves more ethical attention is direct manipulation. With the increase in assisted reproduction technologies, it may indeed become the new mainstay of eugenics in the next few decades. It is not the place here to assess the many ethical implications of such direct genome manipulation, as for today indirect manipulation is the main intervention in animal selective breeding. For now, I can just say that ethical justifications for direct embryonic genome manipulation should at least be consistent with those of any other biomedical intervention. A commonly-used ethical framework for such kinds of interventions is the principlist approach (Beauchamp and Childress, 2019), which introduces four *pro tanto* moral principles in health care: beneficence, non-maleficence, autonomy and justice[3]. Beneficence states that a biomedical intervention

2 Such a claim (called agglomerative theory) is not critics-proof and the reader should bear in mind that value theory remains a much-debated topic. Valuable commentaries and critics about the agglomerative theory can be found in (Hirose and Olson, 2015; Schroeder, 2021).

3 This approach has been adapted to the context of animal experimentation (Beauchamp and DeGrazia, 2020). Although it is specific to this context alone, some insights may prove to be useful for future research on the topic of animal breeding.

should contribute to the patient's welfare or, simply put, must "do some good" to them. Conversely, non-maleficence involves refraining from causing harm to the patient. Autonomy states that any biomedical intervention needs to meet with the patient's consent. Finally, the justice principle requires the biomedical intervention to be distributed in an appropriate and fair manner.

As for now, we can conclude that premise (P1) is plausible regarding indirect manipulation of the embryonic genome. Such manipulation should either respect full reproductive autonomy or, if the reproductive autonomy is somehow altered, promote the choice from a third-party who is acting in the "best interest" of the reproducers and their offspring. Concerning direct manipulation of the embryonic genome, the question remains open, but the growing interest in assisted reproduction technologies (in both humans and nonhumans) urges our ethical attention[4].

2.3 What are the benefits of individual enhancement?

The second premise, (P2), can be supported by many case studies showing that genetic traits can either increase or reduce (sometimes tremendously) the wellbeing of an individual. For instance, *Tay-Sachs* disease is a human recessive neurodegenerative disease associated with severe neurological impairments, cecity and a reduced life span of around two to five years in the most extreme cases. Actively intervening in order to prevent people from having this condition (*e.g.* through PGD and IVF, or by genetically testing the prospective parents) may therefore appear as a desirable objective. More generally, genetic bioengineering that helps to reduce the risk of developing diseases is likely to be beneficial to any individual (as long as it is used wisely). Similarly, traits like intelligence, physical abilities or behaviors do have some genetic grounds (Deary et al., 2009; Grandin and Deesing, 2022), and it seems rather plausible that enhancing these traits can also contribute to the individual's wellbeing.

However, even with such clear benefits, some authors argue that individual enhancement should never take place (de Melo-Martin and Goering, 2022). Among the most significant criticisms, one that has resonance for both human and nonhuman eugenics is the bioconservative argument: we should not interfere with the genetic makeup of an individual because it may undermine some core values of their nature (de Melo-Martin and Goering, 2022). The bioconservative argument therefore defends the primacy of the laws of nature, or the fact that our features come from a contingent luck which cannot (and should not) be controlled. In other words, the argument defends an "inherent nature[5]" for each species that should be promoted and not tampered with. Nevertheless, this argument seems flawed for at least two reasons[6]: it is based on a biologically false assumption, and it may lead to unethical courses of action. Concerning the first reason, the bioconservative argument is not consistent with our current biological understanding of the world. One of the greatest "laws of nature" is indeed the theory of natural selection, which states that there are no such things as an inherent nature or a *telos* in human and nonhuman animals, but that our features are the result of a long-standing evolutive process that is still happening now. Thus, what we consider as core values or core features today may be completely different in a distant future. The second issue with the bioconservative argument is that it promotes a *status quo* concerning individual enhancement. In a sense, the argument states that "things are as they are and we should not do anything about it". However, there are clear examples, such as *Tay-Sachs* disease, where genetic enhancement appears to be the right action for the good of an individual. Not using the possibility of enhancement in this context on the sole basis that it may undermine some contingent core values, whilst knowing the harms that the individual will suffer, can be considered as unethical practice. Overall, the bioconservative argument is unable to convincingly refute the use of individual enhancement.

2.4 Procreative beneficence, procreative non-maleficence, moral obligation and moral supererogation

On the other end of the spectrum, some authors have argued in favor of a moral obligation to enhance children (Savulescu, 2001; Savulescu and Kahane, 2016). In his seminal article, Julian Savulescu defends a principle of procreative beneficence according to which prospective parents have a *pro tanto* obligation "to select the child, of the possible children they could have, who is expected to have the best life, or at least as good a life as the others, based on the relevant available information" (Savulescu, 2001). But such an obligation is highly problematic in many ways and has been refuted by multiple authors (de Melo-Martin, 2004; Parker, 2007; Sparrow, 2007; Stoller, 2008; Bennett, 2009; Hotke, 2014; Saunders, 2015; Holland, 2016), the most convincing refutations being made by Andrew Hotke and Ben Saunders (Hotke, 2014; Saunders, 2015). As Hotke explains, Savulescu presumes his principle of procreative beneficence on the basis that morality requires us to do what we have most moral reasons to do, which is not always true (as I will explain in a moment). More precisely, what we ought to do morally is sometimes a separate concern from what we have most reasons to do (Hotke, 2014). For Hotke, "having the best life" is an ill-defined reason to yield a moral obligation, leading him to modify the principle of procreative beneficence and define a new one out of it. Taking the case of choosing between two embryos as an example, if one is expected to have a life with a net negative state of welfare (*e.g.* having *Tay-Sachs* disease), it can be argued that we have a moral obligation to not

4 The reader can find some valuable discussions on the topic elsewhere (Ishii, 2017; Coller, 2019; Gabel and Moreno, 2019).

5 In nonhuman animals, this inherent nature is often referred to as *telos*, which does not always entail a fixist viewpoint on species. For a comprehensive review of the concept, see (Rollin, 2013).

6 For an in-depths discussion of the bioconservative argument and its limitations, see (Bostrom, 2005).

choose this one and to prefer the second embryo. What seems to be a more reasonable source of moral obligation is to not impose a life of suffering to the diseased one or, in other words "not having the worst life". This new principle can be labeled "principle of procreative non-maleficence", which states that we have a moral obligation to not choose a child if we have evidence that bringing them to life will obviously cause a net negative state of welfare (*i.e.*, a life that has negative prudential value). However, the moment we can show that a child may have an existence worth living, such an obligation cannot be applied anymore. In particular, if we have to choose between several embryos who all have the potential to live a life worth living (*i.e.*, with positive prudential value), then there is no moral obligation to prefer one over the others, even though we may have some reasons to have a preference. There are some variations around this principle of procreative non-maleficence and the reader can find relevant discussions elsewhere (Herissone-Kelly, 2006; Hotke, 2014; Saunders, 2017; Magni, 2021).

At the same time, it is not completely unreasonable to aim for the best child possible. Where Savulescu does make a mistake, however, is when he concludes with a moral obligation just because the best child seems to be the best option. At best, it can be considered as praiseworthy to choose the best child possible if the parents have moral reasons to do so, but they cannot be morally blamed if they do not follow this rule. Ben Saunders, using an example from (Liao, 2008), exemplifies:

> "It is possible that I have more moral reason to emulate Mother Teresa than to pursue other personal projects, such as writing this paper. Nonetheless, I am not required (even *prima facie* required) to do as much for the poor as Mother Teresa did, even if it would be admirable of me to do so. Morality permits me to do less. […] If the only relevant difference between two embryos is that one has [the capacity to enjoy super-fine wine] and the other lacks it, then we may have reason to choose the former, but it is far from clear that we have any obligation to do so. Plausibly, we may be permitted to choose the latter on grounds of a mere preference for some other non-welfare-enhancing aspect of that child" (Saunders, 2015, p. 177).

Such actions are called supererogatory actions: there is moral permissibility to do such actions, but refusing to do the action is not morally wrong and does not require any justification. As a consequence, we can see that the principle of procreative beneficence as a rule for individual enhancement is best understood as a supererogatory principle, which supports the view that we may have moral reasons to opt for the best possible child, but without a moral obligation to do as such. Weighing the principle of procreative non-maleficence against this new understanding of the principle of procreative beneficence, we can see that there is moral permissibility for prospective parents to make liberal choices about their offspring, as long as the children can experience a net positive state of welfare. This raises a question of threshold: what is a limit to a life worth living and what is not? For instance, the case of a couple of two deaf women who undergo IVF with a specific sperm donor in order to have a deaf child has been called into question (Spriggs, 2002). On the one hand, some will argue that deafness is a really severe impairment that cannot be imposed on a person. On the other hand, can such a condition be considered as a life not worth living? Deaf people can have flourishing lives and some authors even talk about the concepts of deaf culture or deaf identity (Parker, 2007). All of these arguments can also relate to animal breeding: we ought to strive for their wellbeing and reduce as much as possible the probability for them to have severe genetic and heritable diseases [7].

2.5 Wrapping up: what is wrong with eugenics?

As we have seen so far, the ethical debates surrounding eugenics are various and show many critical points that need to be properly addressed before morally assessing the practice. With this discussion in mind, we are now holding all the cards to understand why historical forms of eugenics are morally wrong. Indeed, three fundamental characteristics can actually be drawn out from the historical instances of eugenics (de Melo-Martin and Goering, 2022): (a) a controlled birth plan that is exerted by a political power (such as the state), (b) a notion of good that is not prudential, but geared towards a certain political agenda, and (c) the use of coercive measures. This kind of eugenics is called authoritarian eugenics and fits our intuitive, historically-based, understanding of the concept. And the aforementioned discussion renders crystal-clear the moral wrongness of authoritarian eugenics in liberal societies. Indeed, reproductive autonomy, as other kinds of liberties, may be understood either in a negative way (the mere absence of restrictions), or in a positive way (the empowerment of individuals to act as they wish to) (Berlin, 1969). It can be argued that authoritarian eugenics does not respect reproductive autonomy, as both a controlled birth plan by a political power (a) and a notion of good geared towards an arbitrary political agenda (b) are neither accounting for a negative nor a positive understanding of freedom. Moreover, the legitimacy of the use of coercion by such types of eugenics (c) may be called into question following Mill's harm principle, which states that "the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others" (Mill, 1860, p. 223). It seems rather implausible to argue that procreative autonomy can cause sufficient harm to others, thus warranting the state to regulate on forcing or banning certain individuals to reproduce. For all of these reasons, we can state why authoritarian eugenics cannot be morally justified. However, it does not automatically render *all other kinds* of eugenics morally wrong *per se*, and each specific account needs to be carefully explored. I will further discuss this point concerning the liberal account of eugenics in section 4.

7 The question of what constitutes a flourishing life for nonhuman animals or how to actually achieve one (*e.g.* through the assessment of the Five Domains model or Quality of Life) is complex, and its discussion is not in the immediate scope of this article. Relevant discussions have been made elsewhere (Appleby and Sandøe, 2002; Mellor, 2016; Webster, 2016; Yeates, 2011; Yeates, 2017).

3 Authoritarian eugenics and pure-bred breeding: a case-study

In this section, I will review pure-bred breeding's *modus operandi* and maintain that it is mostly associated with authoritarian eugenics. I will base my review on dog breeding to be as specific as possible, but there are similar structures for other domestic species that are more or less prescriptive in their application of their standards [*e.g.* the World Cat Federation for domestic cats (World Cat Federation, 2023), the World Breeding Federation of Sport Horses for sport horses (World Breeding Federation of Sport Horses, 2023), the American Poultry Association for chicken, geese, turkeys and ducks (American Poultry Association, 2023), or the International Committee on Standardized Genetic Nomenclature for Mice concerning laboratory mice (Mouse Genome Informatics, 2023)].

3.1 How does canine pure-bred breeding work?

At an international level, the *Fédération Cynologique Internationale* (FCI) is the worldwide canine organization. It includes 98 countries, each of them writing their own official studbook. According to the FCI:

> "The 'owner' countries of the breeds write the standard of these breeds (detailed description of the ideal type of the breed), in cooperation with the Standards and Scientific Commissions of the FCI. [...]. These standards are THE reference for the judges at shows held in the FCI member countries, but also for the breeders in their attempt to produce top-quality dogs" (Fédération Cynologique Internationale, 2022).

Thus, the breed standard represents the ideal model for a dog of a given breed and a given time. This puts pressure on breeders who need to adapt their selection process in order to keep up with such standards. Otherwise, their lineages are not recognized by national or international bodies. But the concept of pureness in canine breeds is quite recent: the majority of current dog breeds have been created during the last two centuries (Arman, 2007). The creation of a breed in the strictest sense of pure-bred breeding [8] is typically made up of four stages (Arman, 2007):

1. The founder effect, during which a limited number of individuals are chosen in order to contribute to the initial genetic makeup of the breed (the studbook is labeled as "open").
2. When the breed is at some point genetically isolated from other external inputs, the studbook is then closed.
3. The mating process, which inbreeds individuals from the initial pool and their descendants.
4. The selection process, which consists in excluding from the breed any individual who presents an "undesirable" phenotype (a phenotype which seems to not represent well the breed standard).

3.2 Authoritarian components of canine eugenics

First, what can be drawn from the description of the canine pure-bred breeding process is that it is some form of eugenics. Indeed, there are some reproductive techniques that directly aim to improve the genetic quality of a population. More precisely, the founder effect, inbreeding and exclusion (three indirect manipulations of the embryonic genome) are being used in order to obtain specific phenotypes. But there is more: since official studbooks only recognize dogs who are either from the founding event or descendants of them, the reproductive autonomy of these dogs has been externalized to a third party, namely the breeder. A relevant question to ask in order to understand whether such a process is ethical would then be: does the reproductive decisions of the breeder are in the best interest of the dogs? The answer is not clear-cut for every breed, but an overview on breed standards shows that the breeding objectives are seldom prudentially good, but prioritize other elements such as the aesthetics, the working abilities, or certain behavioral aspects. This focus can be so intense that, in some instances like brachycephalic breeds, the respect of procreative non-maleficence can even be called into question (McGreevy, 2007; Rooney and Sargan, 2010). A publication reviewed by the World Organization for Animal Health (*ex.* OIE) has raised awareness on this issue: "Selective breeding in purebred animals has resulted in the loss of genetic diversity, accumulation of detrimental genes and exaggeration of anatomical features associated with physical health risks" (Sonntag and Overall, 2014). Unfortunately, breed standards approved by the FCI remain the main driving force for professional (and unprofessional) breeders because of economic and fame reasons: they cannot put forth their lineage if it is deemed unfit for the pure-breed label. Thus, a paradigm shift in canine breeding would at least include a deep questioning on what a breed means and whether pure-bred breeding even makes sense, ethically speaking.

But then can pure-bred breeding be called authoritarian eugenics? As stated earlier, authoritarian eugenics consists in three fundamental characteristics: a controlled birth plan that is exerted by a political power, a notion of good that is geared towards a certain political agenda, and the use of coercive measures to impose the political agenda. I would remain cautious on calling pure-bred breeding truly authoritarian, as it lacks a fundamental component which is the use of coercive methods on the people making the reproductive choices (in this instance, the breeders): no one, not even the FCI, states that pure-bred breeding is the only way of breeding dogs. Nevertheless, it can be argued that there are some

8 It is worth noting that, due to the known welfare impacts of pure-bred breeding, this strict breeding scheme is now opening to more flexibility. For instance, the FCI acknowledges in its general guidelines the crosses between breed varieties "when necessary [...], with the aim of improving dog health [or] the original function/working abilities", while also adding that "the number of crosses between the varieties should anyway be kept limited" (Fédération Cynologique Internationale, 2023).

indirect incentives towards the popularity for pure-bred dogs. On the breeders' side, as I said before, more legitimacy and money are likely to be gained with pure-bred breeding. On the prospective owners' side, people are subject to social contagion and trending effects when it comes to pure-bred dogs (Herzog, 2006; Ghirlanda et al., 2013). However, as little is known on the topic for now, more research is needed to uncover the exact social dynamics involved in these indirect incentives. In any case, the two other components of authoritarian eugenics are still present in pure-bred breeding. The birth plans are not actually controlled by a state, but there is indeed some kind of power exerted by, *e.g.,* the FCI as an institution with their studbooks. In addition, we have seen that the notion of good entailed by pure-bred breeding is far from being prudential, and what is good in pure-bred breeding is not good for each individual dog, but good from the standpoint of human-centered aesthetics or practical reasons. That is why pure-bred breeding remains quite similar to authoritarian eugenics. At the very least, as long as these two major issues are not addressed, the comparison holds.

4 A defence of liberal and responsible eugenics

Does pure-bred breeding's being similar to authoritarian eugenics mean that we should stop all kinds of artificial selection? I would disagree with such a statement for two reasons: first, ending animal breeding would mean the end of domestic species, which is not a bad thing *per se* but would definitely rule out the possibility of any kind of collaboration between nonhuman animals and humans, such as companionship or work[9]. Second, it is not unreasonable to strive for the best life possible for the animals we are responsible for. This necessarily entails looking out for how to improve the life of prospective individuals, thus achieving artificial selection and eugenics. The problem here is to find out how to achieve such a process in an ethically sound way. In this section, I will suggest some principles that can be applied and can set new ethical standards to animal breeding. However, these elements are far from being the last word on the topic and call for an open debate on the matter.

4.1 The rise of liberal eugenics

In 2004, Nicholas Agar argued for a new type of populational genetic enhancement, which he calls liberal eugenics (Agar, 2004). He defines liberal eugenics in reference to four basic principles: procreative autonomy, benefits for each individual, value pluralism, and public support for reliable reproductive technologies.

> "On the liberal approach to human improvement, the state would not presume to make any eugenic choices. Rather it would foster the development of a wide range of technologies of enhancement ensuring that prospective parents were fully informed about what kinds of people these technologies would make. Parents' particular conceptions of the good life would guide them in their selection of enhancements for their children." (Agar, 2004, p. 5).

As we can see, liberal eugenics, as defined by Agar, is compliant with the caveats I discussed earlier: it focuses on a prudential understanding of good while defending full procreative autonomy and letting the state (or other political powers) intervene only to pursue the best practices in reproductive technologies. However, Agar adds yet another topic for discussion when defending pluralism about prudential value. Indeed, the specific content of the prudential good has not yet been accounted for, and Agar addresses this issue by stating that different conceptions of the good can be realized as long as they bring good to the world without harming the child (Agar, 2004, p. 13). But what if these different conceptions of the good conflict with each other? An immediate answer to this would be that, in case of conflict between different prudential values, the prudential good we need to adopt ought to be the one that brings the best outcomes to the individual and the world. However, the interest of the prospective individual, which is the key determinant for calculating such an outcome, is unknown. And just leaving this choice to a third party who will assume, with their own perspective and conception of the good, what is in the best interest of a prospective individual acts like an *ersatz* (because it could never truly represent the child's own conception of the good). The question is then: on what grounds can we consistently decide for the sake of to-be individuals and how can we mitigate the inevitable bias in our choices for the future generations?

4.2 Caring for the future: the ethics of responsibility

A partial answer to these questions would consist in the principle of procreative non-maleficence, as discussed earlier. It sets an absolute limitation to what kinds of third-party's conceptions of the good can be considered acceptable, and what cannot. However, it is only a negative conception that does not necessarily result in positive outcomes for the prospective individual. Some conceptions of the good may be in line with the principle of procreative non-maleficence, but only provide, at best, a neutral state of welfare. I argue that another principle is needed to actually promote "good births" for prospective beings and ensure they have more than just a life worth living.

While mainly focusing on the environmental and nuclear crises at first, Hans Jonas also tackled this specific issue in the context of life sciences, biotechnologies, and human enhancement. In his book *The Imperative of Responsibility: In Search of Ethics for the Technological Age*, Jonas suggests a principle that aims to preserve future generations from potentially harmful new technologies. He

9 However, it does not mean that all kinds of companion or work relationships are desirable either. We are in desperate need for more ethical grounds in our relationships with nonhuman animals. The question of whether domestic animals should merely exist is vast and complex, as shown by (du Toit, 2020), and it exceeds by far the scope of this article.

calls this principle the imperative of responsibility and defines it as follows: "Act so that the effects of your action are compatible with the permanence of genuine human life" (Jonas, 1984, p. 11). We can easily generalize this imperative to include all sentient nonhuman beings (after all, I cannot see any reason to restrict this concept to humankind only), but there is still one point worth discussing before applying this imperative to the case at hand: what makes one's life "genuine"? In Jonas' perspective, a genuine human life is achieved when individual dignity, *i.e.* the capacity to live a worthy life, is preserved (Coyne and Hauskeller, 2019). In a sense, Jonas made a Kantian account of the responsibility we ought to have towards future generations; we should strive to preserve the dignity of each being, or what makes their life a worthy one. Therefore, in order to ease the understanding of the imperative of responsibility in this context, I shall rephrase it as "Act so that the effects of your action are compatible with the permanence of a worthy life[10]".

What does this imperative say about animal breeding? I see two kinds of lessons that can be drawn out of it. The first one is a restrictive implication according to which an action that is incompatible with the permanence of a worthy life is wrong. This implication is similar to the principle of procreative non-maleficence and restricts the scope of actions that are deemed morally permissible. However, a second implication, the proactive implication, can also be defended. Indeed, if the effects of our action need to be compatible with the permanence of a worthy life, it actually promotes any action that can help an individual to better fit their environment, because it increases the odds to preserve a worthy life over time. With this interpretation, it is our responsibility to improve such odds for the animals under our care, thus promoting positive states of welfare (Mellor 2016), in particular when it comes to the different non-natural conditions they are likely to live in (*e.g.* hornless cows in a farming setting, or dogs with increased social abilities in a urban area). For example, if we see a condition such as canine brachycephaly as an impairment for the ability of future generations to live a worthy life (because it does not bring those individuals with a good state of welfare), the imperative of responsibility not only requires us to prevent dogs from having this condition (restrictive implication) but also promotes actions that help to eradicate this condition (proactive implication). In doing so, we are actually fostering "good births" (on a prudential sense) for the future generations.

4.3 New ethical standards for animal eugenics and open problems

This review of liberal eugenics and the imperative of responsibility leads me to defend the following requirements for a breeding system to be ethically sound:

1. It is based on a solid theory of value (*e.g.* agglomerative theory).
2. It acknowledges value pluralism, *i.e.* there are different conceptions of the good.
3. Breeding objectives are in the best interests of each individual. In particular, they cannot lead to a net negative state of welfare and they ought to be compatible with the permanence of a worthy life for future generations.
4. If direct genome manipulation of the embryo is being used, it is at least compatible in theory and in practice with the principles of beneficence, non-maleficence, autonomy and justice.
5. Institutional power only intervenes to support the development of more reliable reproductive technologies.

In practice, such a new way to breed animals has two main consequences: first, it reinforces the central role of breeders in the breeding process by acknowledging their own conception of the good and suppressing the need for international committees like the FCI. Second, it puts a great emphasis on the welfare of the bred animals and on how it can be further improved. To be applicable, this new system of animal breeding requires a shared responsibility between breeders, the general public, policymakers , animal welfare scientists, veterinarians, and other specialists in animal science, as well as some coordinated actions (Arman, 2007; Ormandy et al., 2013; Van Eenennaam and Young, 2018; Ritter et al., 2019). For instance, the access to clear information on animal genetic and hereditary diseases [as emphasized in (McGreevy, 2007; Rooney and Sargan, 2010; Kirkwood, 2012)], the development of new reproductive technologies, or the edition of regulations and legislations to prevent misconducts, bad treatments and assess welfare consequences of breeding strategies (Voogt et al., 2023).

However, these new standards also bear some limitations that need to be addressed in future research. The most important one is the choice of a theory of value. I presumed for simplicity reasons that only prudential value should be considered. But a more appropriate choice of value theory would also include other kinds of values (*e.g.*, aesthetic value, productive value, utility value, *etc.*). In this case then, i would have to describe how these different values interact with one another and in what contexts some values would bear more weigh in our decisions than others would do. Concerning animal breeding, one can surely define an aesthetic value or a productive value which may serve as justifications for a "good" breeding program. For instance, many canine and feline breeds are bred for their aesthetic value (Pugs, Chihuahuas or King Charles Spaniels; Burmese, Devon Rex or Persian). Similarly, a productive value can be tied to many farming breeds such as Belgian Blue cattle for the production of meat , because they have an increased bodyweight and have a better propension to convert their feeding into lean muscle mass (Kambadur et al., 1997), or Holstein Friesian for the production of dairy products which is higher in volume compared to other breeds. For these cases however, I believe that considering these additional values does not override the primacy of the prudential value. In other words, aesthetic or productive considerations are not strong enough to justify overly mitigating

10 This definition also allows to link the imperative of responsibility to the relevant literature on what a "life worth living" means in nonhuman animals (Appleby and Sandøe, 2002; Mellor, 2016; Webster, 2016; Yeates, 2011; Yeates, 2017).

the health and welfare of individuals. That is why the simplification of only considering the prudential value makes sense as a first approach to the problem. But of course, one can imagine a case where an added value would be so important that the prudential would be put aside. Such a case would be however marginal at most, and not significant for the present discussion.

5 Discussion

Eugenics brings a relevant ethical framework to question the methods we employ to breed domesticated animals. This is especially true concerning pure-bred breeding, which does not promote animal welfare but complies with some sorts of authoritarian eugenics. In this paper, I have first given some arguments for the moral permissibility of using eugenics, and to the effect that some types of eugenics (including authoritarian eugenics) are indeed morally wrong. I have then argued that an ethically sound breeding system should strive for a new definition of breeds that advocates the best interests of animals and value pluralism. In particular, I am defending a specific type of eugenics that is both liberal and responsible. Such a new way to breed animals should not be seen as an attempt to hinder our domestication process (although the ethics of animal domestication remains an open debate), but rather as a chance to take full responsibility over the kind of relationship we want to have with nonhuman species.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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